PRODUCTS finishing

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CONTENTS

Finishing at Cleveland's Lamson and Sessions.. 40
By BRYANT W. POCOCK

Electricity for the Plater, Part II..... 54
By D. A. COTTON

Pre-Color Coating Metals for Small Stampings.. 66
By BURR PRICE

Organic Chemistry, Part 4 72
By DR. C. B. F. YOUNG

Safe Use of Solvents..... 94
By LILLIAN GORDON

News of the Industry.....106

New Equipment and Materials 110

Opportunity Section 122

The Finishing Touch.....124

Catalog Library 126

Index to Advertisements 128

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Products Finishing

Personal Corrosion

Old Doc Weatherby had been our family doctor for years, so it seemed perfectly natural for me to deride the old gentleman on the subject of my bad cold. "One would think," I stated malevolently, "that with all the experience you medics have had, you'd be able to keep people from catching colds in this age of so-called science."

I could see that this got under the old man's hide; but he answered calmly enough. "There's nothing mysterious about colds, son. The trouble's with people, not with science. You see, the lining of your throat and nasal passages sloughs off every few weeks, and with it goes all the immunity it has built up. Somehow or other the new membranes have to develop their own immunity."

"Develop their own immunity?" I repeated. "Say, Doc, I think you've got something there. That gives me an idea."

"How so, son?"

"Because the same principle applies in my business. Or in any other business, for that matter. Did you ever hear of a person getting rusty?"

"You've got it, son. You've hit the nail right smack on the head. There's an exact parallel between catching cold and getting rusty. No matter what you do, you've got to keep on doing it, or sooner or later the complicated mechanisms responsible for your professional abilities will fail to respond. You've got to inject new life into those abilities, or what amounts to an immunity against incompetence, by supplying the brain which controls them with a steady stream of new ideas, up-to-date information and modern principles of technological know-how. Otherwise the cells and tissues which are continually being replaced in your body will be supplanted by ignorant cells and tissue, your corrosion resistance will be lowered, and you might just as well go out to the junk yard and climb up with the rest of the old rusty iron."

"That's an unusual way of putting it, Doc, but it would seem that a most important question for me to keep in mind would be, how many hours am I good for in the salt spray cabinet of my business?"

"That's about it, son."

Finishing at Cleveland's Lamson and Sessions

By BRYANT W. POCOCK

THE Lamson and Sessions Company of Cleveland Ohio, is among the worlds' largest manufacturer of nuts, bolts, rivets and screw products. As fabricator of approximately 30,000 different items, each one of which at one stage or other has presented its own peculiar set of puzzling and challenging features, Lamson and Sessions has undoubtedly solved its millionth problem. Expert in the manufacture of small parts, its philosophy of business has been summed up in the words of a plant official: "A bolt, nut, rivet and screw plant is a jobbing house. It makes whatever the customer wants."

In order to appreciate fully the ramifications of elcctroplating operations at Lamson and Sessions, it is necessary to understand something of the background of machining procedures and special manufacturing processes involved in fabricating some of these 30,000 parts and getting them ready for plating. Specifications on many of the items require extremely close tolerances on thickness of plate. Other items which are long and narrow must be protected against microscopic departures from straightness brought about by temperature changes during plating and finishing and from variations of plating thicknesses. Some must be so exact that

(Above) General view of plating room at Lamson and Sessions. This large room houses the main plating equipment of the West 85th Street plant, including 1,000-gallon Udylite installations for cadmium and zinc.

that no tolerances are permissible. It is obvious that the history of manufacture of such parts, including heat treatment and stress relieving, must possess considerable bearing on the choice of proper technique for electrodepositing the ultimate metallic coat.

Particular parts whose fabrication may entail more than ordinary complications or whose ultimate functions may be unusual are termed "specials." Most of these specials are either internally or externally threaded, which brings up the question of relative advantages of rolled thread versus cut thread. It has been demonstrated again and again that parts threaded by roll threading operations have stronger threads than do cut-threaded parts. After roll threading, the grain runs parallel to the surface of the thread, whereas in the case of a cut thread, the grain maintains the direction which it had when cut. It naturally follows that a cut thread can be sheared off more readily than a rolled thread and that the tensile strength of the roll threaded bolt is increased through cold working (1, 2, 3, 4, 5). Lamson and Sessions engineers are also interested in learn-

(1) "Bolts, Nuts and Screws," a collection of practical discussions on engineering, design and production of headed and threaded products, The Lamson and Sessions Company, Cleveland, Ohio, 1944.

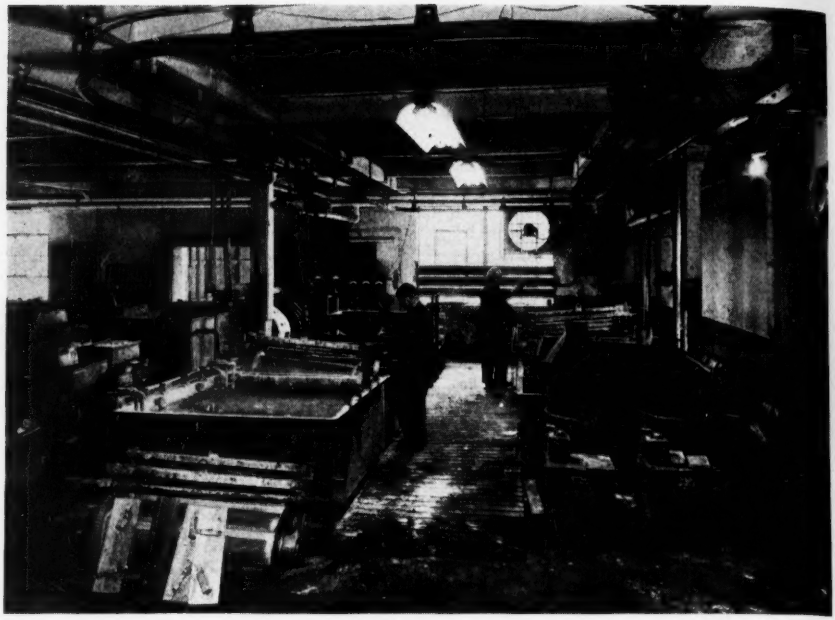
(2) Case, Sr., George S., and Peterka, A. E. R., "What Is the Difference Between Rolled Thread and Cut Thread Bolts?" *Hardware Age*, December 16, 1937.

(3) Horton, Holbrook L., "Precision Thread Rolling with Flat and Cylindrical Dies," *Machinery*, pp. 158-69, March, 1944.

(4) Stewart, Wm. C., "Nut Thread Tolerances and Gaging," an address before the American Institute of Bolt, Nut and Rivet Manufacturers, Cleveland, Ohio, March 23, 1939.

(5) Stewart, W. C., "Bolts and Nuts," *The Iron Age*, June 5, 1941.

View of Lamson and Sessions Company Department at Acme Plating Company in Cleveland showing barrel plating unit for cadmium and still plating units for cadmium and zinc. Use is made of Monel metal cylinders, electric hoist operated and gear driven, for cleaning and pickling operations prior to cadmium plating parts.

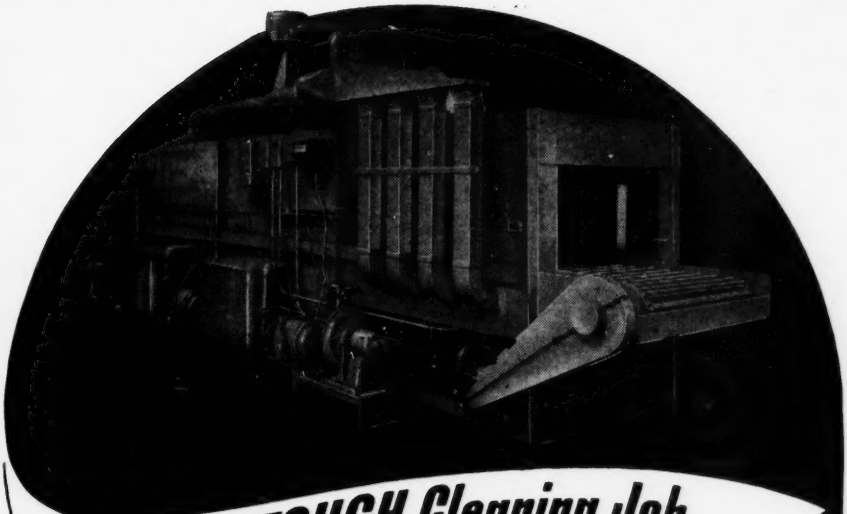


Barrel plating installation for zinc at Lamson and Sessions Department, Acme Plating Company

ing what significance if any these differences have for adhesion and durability of electrodeposited coatings.

To start at the beginning, the original stock enters the plant and is stored in hot coiled form or "hot rod." In the first operation, this blank stock is pickled in sulfuric acid treated with inhibitor. It is then rinsed, after which two pre-die operations are performed. One of these consists in liming with calcium hydroxide and the other in the application of some wire-drawing compound such as aluminum stearate. These two substances act as die lubricants and tend to produce a surface condition resistant to subsequent corrosion. During the next step, the rod is drawn to required size through dies and then recoiled for distribution to headers, boltmakers or rod machines and subsequent fabrication.

Where boltmakers are used manufacture is virtually completed on them, parts being headed, extruded, trimmed, pointed and threaded in a single operation. In the headers, parts are subjected to the heading operation and the above operations of extrusion, trimming, pointing and threading are added as necessary. In the rod machines, the stock is cut off to size, threaded and headed. All parts may progress, when required, to secondary equipment for secondary operations such as drilling, tapping, slabbing, slotting, special bending or processing, coining, grinding, milling, roll and cut threading, reheading, and so on. The sequence of operations, including heading, extruding and rolling, produces an almost glassy finish, as the metal surface is neither cut nor ruptured. Cut threading, drilling, tapping, slotting, and so on, on the



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other hand result in rupture of the metal and give rise to special problems for consideration in plating. One of these problems concerns the formation of feather edges on which plating tends to build up.

Screw machines enter the sequence at this point in primary operations on bar stock and secondary operations on headed parts,,followed by the same possible secondary operations as listed above for rod stock.

In the case of hot headers, the original material may be in the form of rod, bar or strip stock, with the same possible secondary operations. As contrasted with the foregoing, hot-heading operations are conducted at forging temperatures. Hot headers are of two types—tong and continuous rod. In tong heading, the work is sheared to length and heated on one end in a forge furnace. It is then headed and the necessary secondary operations performed. In continuous rod heading, the entire rod is heated in a continuous furnace, fed into continuous headers and conveyed on for the secondary operations. All products include a large variety of special ribs and plates, each of which creates a special plating problem.

The fabrication of very small diameter cotter pins, such as 1/32-inch, presents a handling problem during plating because of their small size and the number of different lengths manufactured. Some specials, again, have such a fine grind that they must be individually fixed on board racks to prevent damage in handling. Other plating problems arise from class of fit. Class 4 and Class 5 fits, for example, are interference fits with very limited tolerances. There is actual physical inetrference between mating

Another view of Lamson and Sessions Company Department at Acme Plating Company showing rackers placing wiring in strings of small parts to prevent nicking of threads in cadmium plating and also to provide for uniformity of deposits.

5 YEARS' SERVICE
NO EVIDENCE OF ATTACK

FIVE YEARS AGO this tank began taking the terrific punishment of continuous pickling at 210° F. A recent thorough inspection showed no evidence of attack on the Asplit Cement that bonds the bricks. It has actually resisted acid and abrasion better than the bricks themselves.

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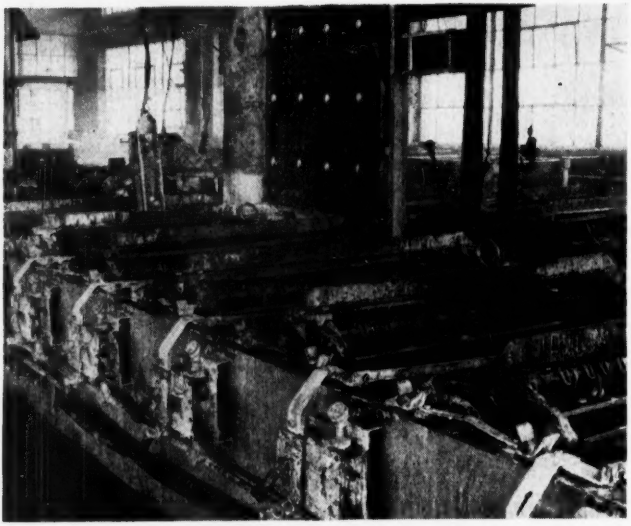


Barrel plating unit used at Lamson and Sessions for cadmium plating. The 1,000-gallon tank is equipped with six barrels each having its own control panel on a master control board.

parts in these class of fits, and plating must be done rigidly to specification. In the case of reversed taper threads for aircraft studs and bolts, the problem arises not only of maintaining the thread form but also of maintaining taper tolerances. Ordinary routine fittings plated at Lamson and Sessions fall into Class 2 and Class 3 fits, but a sizable portion of specials are of Class 4, with some Class 5. Hollow studs with stress-relieving holes have to be shaken in order to remove trapped air before the interior surfaces can be plated. These studs are heat treated to 35 Rockwell C in blank form and the threads rolled afterward to avoid decarburizing after threading.

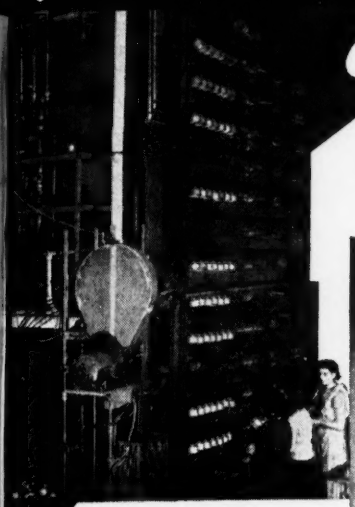
Most parts are now plated with either cadmium or zinc, using Du Pont Cadalyte for cadmium and Zin-O-Lyte for zinc. Udylite equipment is used throughout. A complete list of finishes produced at Lamson and Sessions would include black oil, zinc, copper, nickel, tin and cadmium plate, copper oxide, bright dip, genuine blue, water tumble, Parkerize, cyanide, and others. Prior to the war, finishes were also produced by hot galvanizing, hot tinning, lacquering, as well as chromium and lead plating. The black oil finish referred to is produced following a stress-relieving heat treatment by a quench in a hot solution of soluble oil. Lamson and Sessions plants are equipped with both gas and continuous electric heat-treating furnaces with modern atmospheric control complete for all types of heat treatment.

Zinc plating is carried out in the following steps at Lamson and Sessions, using Du Pont Zin-O-Lyte bright zinc bath and Udylite equipment:

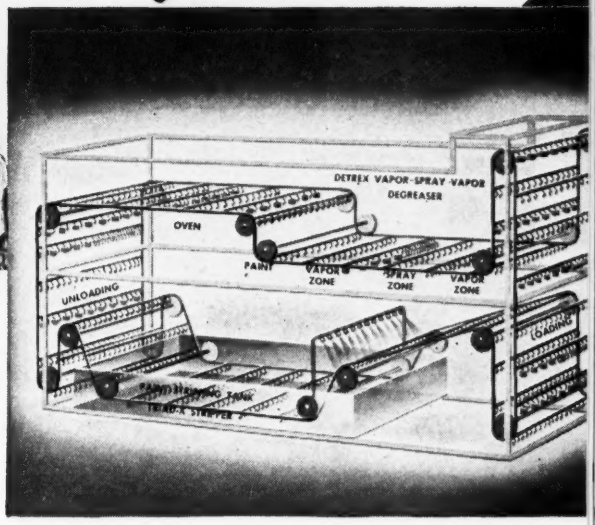
1. Immersion in hot cleaning solution.
2. Cold rinse.
3. Immersion in hot inhibited HCl pickle.
4. Cold rinse.
5. Loading platform.

6. Barrel plating in a 1,000-gallon, 6-barrel Udylite unit with the following specifications:

Zinc	4.5	oz./gal.
Cyanide	12.5	oz./gal.
Caustic	10.4	oz./gal.
Molybdenum	0.21	oz./gal.



Clearing the Line . .



WITH TRIAD X

To keep racks and conveyor hooks free from paint build-up, more and more production lines are using Triad X in the strip tank as illustrated, stripping the fixtures clean each time around. The effective stripping action of Triad X on paints, enamels and lacquers prevents contamination of cleaning and bonderizing solutions. As it eliminates any need for removing the racks for cleaning, it permits continuous operation of production conveyor lines.

Triad X is a heavy-duty stripper that has proved its efficiency in countless other applications; for instance:

- **Cleaning paint drums**
- **Stripping parts preparatory to repair or refinishing**
- **Cleaning up contaminated booths prior to use of Triad Spray Booth Compounds**

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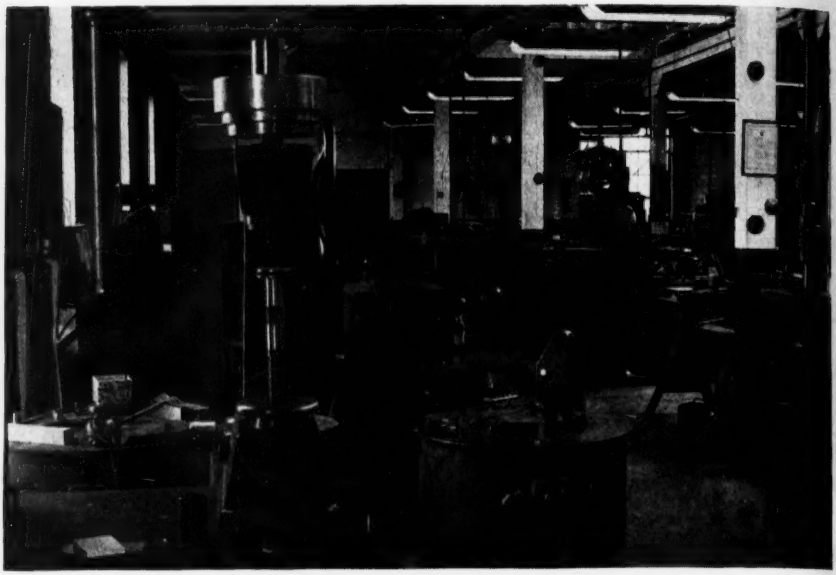

Physical testing laboratory at the West 85th Street plant of Lamson and Sessions Company

Ratio Zn:CN 2.75
Temperature .....85-90° F.
Anode ..... 2 lb./gal.
E.M.F. .....10-12 volts

Note: Du Pont brightener added periodically to maintain bright finish.

7. Dump tank.
8. Cold rinse.
9. Hot rinse.
10. Centrifugal drying.
11. Test for plating thickness.

Cadmium plating of aircraft parts is carried out in the following steps, using Du Pont's formula and Udylite equipment:

1. Immersion in hot cleaning solution.
2. Cold rinse.
3. Immersion in cold inhibited HCl pickle.
4. Cold rinse.
5. Loading platform.
6. Barrell plating in a 1,000-gallon, 6-barrel Udylite unit with an individual control panel for each barrel according to the following specifications:

Cadmium ..... 3.75 oz./gal.
Cyanide .....14.5 oz./gal.
Caustic .....2-3 oz./gal.
Sodium carbonate .....2-6 oz./gal.
Ratio Cd:CN 3.75
Temperature .....70-90° F
Anode ..... 2 lb./gal.
E.M.F. ..... 6-11 volts, variable with type of thread.

7. Dump tank.
8. Cold rinse.
9. Spray rinse.
10. Hot rinse.
11. Centrifugal drying.
12. Test for plating thickness.

The main source of E.M.F for zinc and cadmium at the West 85th Street plant are two 4,000-amp. generators supplying 12 volts.

For Parkerizing, parts are immersed in hot cleaning solution, pickled

THE NEW APPROACH TO ZINC PLATING

The Attention of zinc platers focuses today on General Chemical Zinc Fluoborate Solution, for this new electroplating chemical holds promise of being far superior to other baths for many strip and tank applications.

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In addition, Zinc Fluoborate is proving particularly adaptable to tank or barrel plating of malleable and cast iron castings, since it gives excellent adherence and uniform coverage together with a lustrous finish.

General Chemical Fluorine Division has prepared operating data sheets on Zinc Fluoborate, which are of interest to every zinc plater. For copies of this useful material and for full information on experimental and commercial quantities of Zinc Fluoborate, contact the nearest General Chemical Sales and Technical Service Office below or write General Chemical Company, Fluorine Division, 40 Rector Street, New York 6, N. Y.

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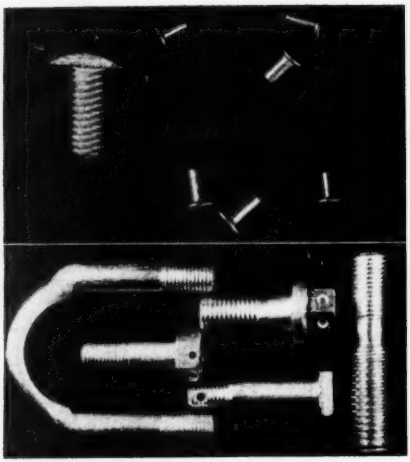


(Above) Tin plated parts. (Below) Cadmium plated parts

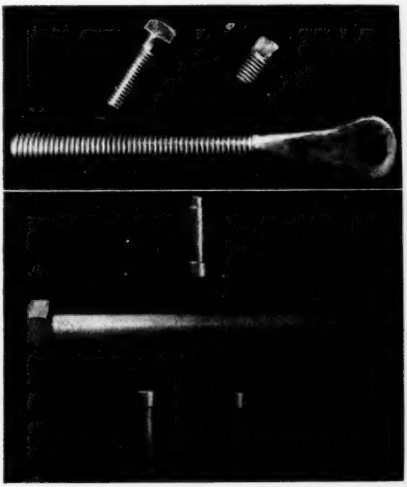
in hot sulfuric acid, cold rinsed, drummed, Parkerized conventionally, hot rinsed, immersed in hot chromic acid, steam dried, oiled, and centrifugally dried.

In addition to plating departments in its Cleveland East 63rd Street and West 85th Street plants, Lamson and Sessions has a considerable amount of plating done for both plants by the Acme Plating Company on East 21st Street. Similarly, the C. L. Gougler Company at Kent, Ohio, supplements the Pentrate and anodizing facilities of the Lamson and Sessions' Kent plant, featuring cadmium and zinc plating and the finishing primarily of nuts and other internally threaded parts. The Birmingham and Chicago plants also utilize job platers.

Barrel zinc plating as done by Acme for Lamson and Sessions involves the following steps:

1. Placing of small parts in Monel metal cylinder.
2. Immersion in hot alkaline cleaner.
3. Cold water rinse.
4. Hot sulfuric acid pickle.
5. Cold water rinse.
6. Warm hydrochloric acid pickle.
7. Cold water rinse.
8. Transfer station: parts transferred to hard rubber plating barrel. All the above steps are performed on one side of the aisle.
9. Zinc plating in Promat zinc bath.
10. Cold water rinse.
11. Cold water rinse.
12. Hot water rinse.
13. Centrifugal drying. Nos. (9) through (13) are performed on other side of aisle.

Barrel cadmium plating by Acme for Lamson and Sessions is done exactly as above with the exception that a Promat cadmium bath is used. In addition, there are two tanks of Cadalyte for cadmium plating in the Lamson and Sessions department at Acme. These tanks are used for plating studs made by Lamson and Sessions for one of the aircraft engine manufacturers. The studs go



(Above) Parts zinc plated using Du Pont Zin-O-Lyte formula. (Below) Aluminum parts anodized

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CHARACTERISTICS:

High resistance to soap, alkali and moisture . . . perfect matching of color with porcelain enamel tubs . . . complete color stability . . . long wearing qualities (is chip-proof and practically immune to scratches) . . . maximum protection against rust, due to excellent bonding properties.

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All *Vedoc* finishes are developed for a specific use, then slightly varied to best fit into each customer's production setup. For more information about these "better finishes", write . . .

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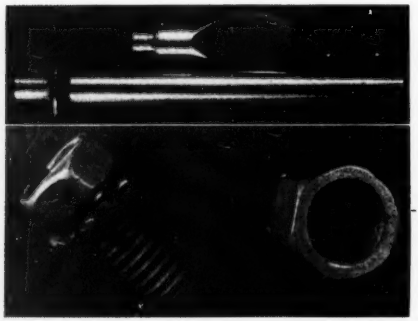
through the following processes:

1. The studs are individually fastened on 24 B. & S. gauge copper wires, from 6 to 16 studs on a wire depending on their size and weight.
2. A number of wires are placed on hooks for handling.
3. Thorough degreasing in trichloroethylene (Detrex).
4. Immersion in a hot electrolytic alkaline cleaner.
5. Cold water rinse.



(Above) Parts with water tumble finish. (Below) Parkerized parts

6. Hydrochloric acid pickle at room temperature.
7. Cold water rinse.
8. Cadmium plating in Cadalyte bath. Two 1,000-gallon Stevens semi-automatic variable-speed plating machines are in use. These are fed at 1.5 to 2.0 volts at 15 amp. per sq. ft. by 1440-amp. rectiplaters. Temperature is maintained at 75 + 2° F. by Sarco temperature regulators operating by cold water cooling coils and steam heating coils.
9. Cold water rinse.
10. Cold water rinse.
11. Bright dip.
12. Hot water rinse.
13. Excess water blown off by air guns.
14. De-wiring of parts.
15. Placing of parts in perforated baskets.
16. Placing of baskets in Homo furnace for relief of hydrogen embrittlement.
17. Cooling to room temperature.
18. Packing.

To obtain a uniform thickness of plating on studs, Acme Plating Company employs insulating rubber mats on the bottoms of the plating tanks and insulates the anodes from direct contact with the sides of the tanks. This eliminates stray currents and aids in preventing build-up of plating on studs held near the bottom of the wire. Eighteen-inch anode baskets are also used to improve uniformity of current passage from anode to cathode.

Difficulty was originally experienced with obtaining plating on certain alloy steel parts, but this was overcome by adding 2 per cent of normal acetic acid in the hydrochloric acid pickle. Hot punched nuts also present a unique problem of their own since the tapped threads are bright and clean and the remaining surfaces of the nut black and scaly. Pickling times are altered as necessary to produce even plating.

At Lamson and Sessions extreme care must be utilized with both standard parts and specials due to shape, material, surface condition, design and form to obtain even and accurate distribution of plating. The technical visitor is impressed by the sincerity with which this firm endeavors to combine the best available American "know-how" from all phases of engineering into a unified system of technology functioning toward the common goal of attaining the highest quality possible.

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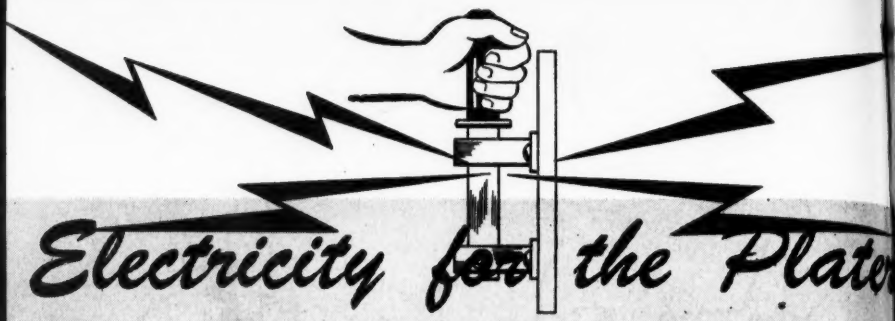

Electricity for the Plater

D. A. COTTON

Part II

IN 1269, Peregrinus found that a magnet has definite poles. In other words, that a bar magnet attracts bits of iron only at its ends and that these ends have different polarity. He first gave out the law that the north end of one magnet attracts the south end of another, but did not discover or announce that the poles of like polarity repel each other. He was probably responsible for the start of the misstatement that the end of the compass needle pointing north should be called the north end. Obviously, the end of the compass needle that points toward the north magnetic pole is the south end of the needle or the north-seeking end.

He first showed that a magnet not only attracts iron over intervening space but that it compels iron to assume a definite position in that space. He really first recognized the presence of a magnetic field, which is the very cornerstone of electrical development. Peregrinus even made a spherical magnet and showed how to locate its poles by use of a piece of soft iron. That is, he almost discovered that lines of magnetic force pass from one end of a magnet to the other.

Sarpi, who lived from 1152 to 1623, found that iron can be magnetized by other means than contact with a lodestone, such as by hammering a piece of iron while holding it in a north to south position.

William Gilbert, who lived from 1540 to 1603, deduced what Peregrinus failed to perceive; namely, that the earth is a huge magnet. Cabaeus, in 1629, brought out what Peregrinus more than three hundred years before had missed; namely, that magnetic poles of like polarity repel each other. He also almost discovered the magnetic spectrum. He pictured the lines of force about the poles of a magnet as shown in Fig. 5.

About sixty years later, Descartes (1692) showed that lines of force are closed lines passing from the north pole to the south pole. (See Fig. 6.)

In 1779, Charles Coulomb, influenced by a study of the deflection of the compass, began to experiment with a torsion balance. In 1785, he used this instrument to measure electrical and magnetic forces. He discovered that electrified bodies exert a force directly proportional to the product of their charges and inversely proportional to the square of the distance between their centers. This

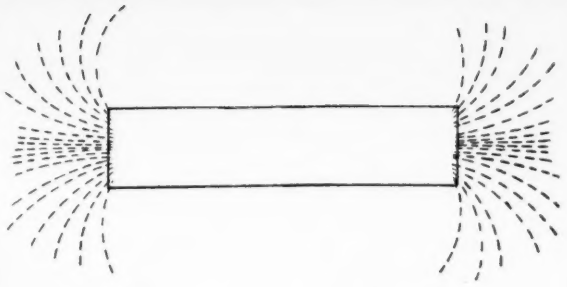

Fig. 5—Magnetic lines of force according to Cabaeus

is expressed mathematically as $f = \frac{qq' k}{r^2}$, where **k** is a constant depending on the units of force, **q** and **q'** the charges, and **r** the distance.

In about 1751, Adamson had brought to London from Africa an electric fish, Silurus electricus. The similar sensations caused by the fish and discharges from the Leyden jar led to the conclusion that they were both effects of the same origin, but it was not until 1837 that this was proven by charging a Leyden jar from the fish.

Galvani, an Italian physiologist, became interested in this evidence of animal electricity. In 1780, while demonstrating a nerve-muscle reaction in a frog's leg, another group of students was using a static machine. One of the students noticed that when the nerve was touched by a metal instrument, the muscle twitched every time a spark discharge occurred on the machine. The next observation was that if two dissimilar wires were joined at one end and the other ends touched to the nerve, a twitch was produced.

Galvani missed the vital point of this discovery by trying to attribute the action to physiological causes, but Alessandro Volta (1745-1827), a friend of Galvani, after experimenting for several years, finally, in 1794, definitely concluded that the cause of this prenomenon lay in the metals. By using an electroscope, he showed that contact of two dissimilar metals produced electrification (1796).

Between 1796 and 1799, Volta produced electricity by placing cloths moistened with solutions of conducting salts between metal plates. Finally, he discovered that more powerful effects were produced by a pile of alternate plates of two unlike metals, such as copper and zinc, separated by layers of wet cloths. This was the famous "Voltaic" pile or "Galvanic" cell and was announced about 1800.

In 1796, Ritter noted that metals in contact with each other in salt water corroded as a result of some effect which we now term electrolytic action. In 1800, he demonstrated that when the free ends of a pair of wires were dipped into water, the gases

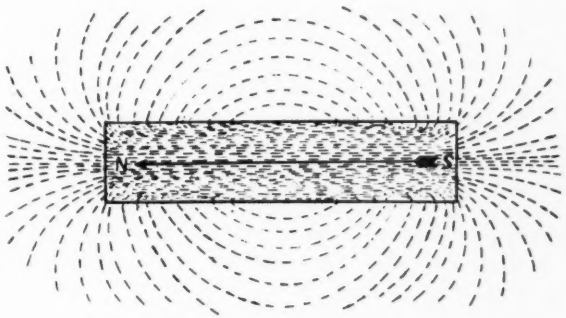

Fig. 6—Field of force about a bar magnet

hydrogen and oxygen were produced. This was probably the first observation of electrolysis, which is the

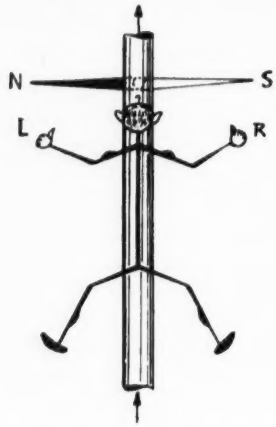

Fig. 7—Ampére's rule. Observer above conductor

breaking down of a chemical compound into its constituent elements by the passage of electric current through it. He also observed the deposition of copper from solution.

In 1801, Ritter brought forth the idea of a series of solution tensions. This potential series of elements was also discovered by Volta independently of Ritter and is known as Volta's series.

In 1819 Oersted (Hans Christian, 1777-1851) made some very important discoveries; namely, that (1) if a compass needle be brought near a wire carrying current, the needle is deflected, (2) the amount of deflection is dependent on the amount of current flowing in the wire, and (3) a current circuit free to move is deflected by a fixed magnet pole.

Oersted did very little with his discoveries and it remained for André M. Ampére (1775-1836) in 1820 to really develop the laws connected with the relations between current flow and deflection of the compass needle.

Ampére showed that if a current flows from the positive pole of a battery (using the conventional application of the term positive first introduced by Franklin) away from the feet of an observer toward his head, he will see the north pole of a compass needle located in front of him deflect to his left. Another way of expressing this is as follows: Assuming an observer is swimming with the current, facing the conductor, a compass needle on the other side of the conductor will always be deflected to his left. (See Figs. 7 and 8.)

Another simple way of showing it is given in Fig. 9. Imagine the current flowing away from the observer, then the magnetic lines of force will pass around the conductor in a clockwise direction.

Another called the "right-hand rule" is shown in Fig. 10. Grasping

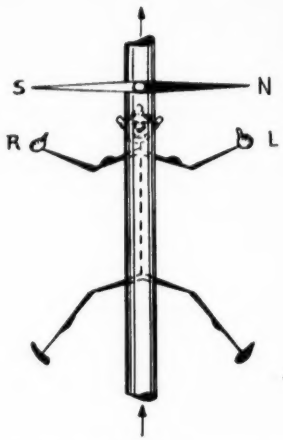

Fig. 8—Ampére's rule. Observer below conductor

the wire with the right hand, the thumb pointing in the direction the

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current is flowing, the fingers will point in the direction the magnetic lines of force are flowing.

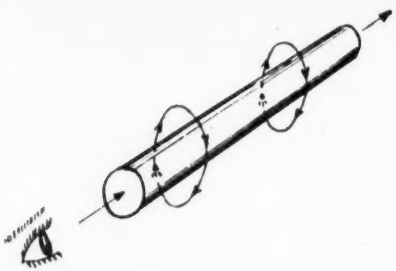

Fig. 9—Magnetic lines of force about a conductor

In 1827, George Simon Ohm (1787-1854) formulated Ohm's law which is one of the fundamental laws for electrical calculations. The law is as follows: The current **I** through a conductor is directly proportional to the potenial difference **E** between its ends and inversely proportional to the resistance **R** of the conductor. Stated mathematically this law is:

$$I = \frac{E}{R} \text{ and with its permutations}$$

$$E = IR$$

$$R = \frac{E}{I}$$

We have now reached the point where it is necessary to digress from the historical development of the electrical science and discuss the meaning of the various electrical units.

The first unit to be considered is very logically the unit of electric potential. The first part of Ohm's law states that the current through a conductor having constant resistance is directly proportional to the potential difference of its ends.

The conception of electric potential is in many ways analogous to hydraulic pressure. In fact, there are so many similarities between hydraulic principles and those of electric circuits that, although such comparisons may have become trite, they are nevertheless helpful in arriving at a concrete understanding of the fundamental units of measurements.

Let us consider Fig. 11. It is obvious that if the valve **V** be opened, water will flow from tank **H** to tank **L** because the water in **H** is at a higher level than that in tank **L**.

Similarly in Fig. 12, if the terminal **H** has an electrical charge in excess of that on **L**, a current of electricity will flow from the point of higher potential to that of lower potential, if the two are connected by a conductor. We have marked the **H** terminal with the positive or plus sign and the **L** terminal with the negative or minus sign.

In all electric circuits, the point of higher potential is conventionally designated as positive and the point

Fig. 10—Right-hand rule for direction of magnetic lines

of low potential as negative and current is assumed to flow from positive to negative. This is due to Benjamin

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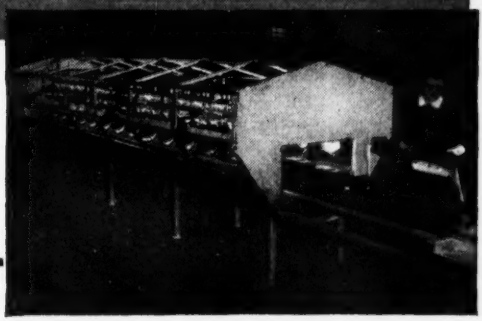

164

Franklin's arbitrary designation and science has continued to follow this convention, although, as we shall later see, current really flows from negative to positive.

Hydraulic pressure is called "head" and is measured in feet or is expressed in pounds per square inch. The unit of electric potential is called the "volt" in honor of Volta who discovered the voltaic pile. The potential of an electric circuit is usually des-

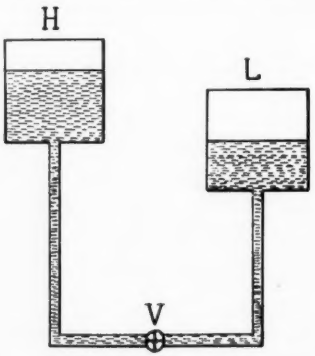

Fig. 11—Hydraulic difference of "head"

ignated simply as voltage. In stating that the potential or voltage of a circuit is 120 volts, we are simply stating that the pressure available for forcing current through the circuit is 120 volts.

The unit of voltage is defined as follows: The international volt is the potential difference between the ends of a conductor having a resistance of one ohm, when the steady current through it is one international ampere.

The unit for measuring strength of an electric current is the ampere. It is defined as follows: The international ampere is that constant current which in one second deposits 0.001118 gram of silver from a solution of silver nitrate.

Thus, the ampere is really a rate-of-flow unit; it measures strength of current rather than quantity. It corresponds to gallons per minute or per hour in the hydraulic system.

The unit expressing quantity of electricity flowing in a circuit is the coulomb. The amount of electrical charge transferred by one ampere in one second is called a coulomb. Thus, an ampere is one coulomb per second; the coulomb is one ampere-second. The coulomb will be discussed in more detail later.

The other factor named in Ohm's law is resistance of conductor. Resistance is, as its name signifies, that physical characteristic of a substance by virtue of which it opposes the passage of an electric current through itself.

The unit of resistance is called the "ohm" after the discoverer of Ohm's law and is defined as follows: The international ohm is the resistance at 0 deg. Centigrade of a column of mercury 106.3 centimeters long and one square millimeter in cross-sectional area. In this definition, note the implication that temperature affects resistance. This is true, as the resistance of a conductor increases with rise in temperature and must be reckoned with in the design of current-carrying parts.

The resistance of a conductor varies directly with its length, inversely with its cross-sectional area, and directly with a constant which may be called its specific resistance or resistivity and which differs for different materials.

Expressed mathematically, $R = \frac{KL}{A}$

where **R** is resistance, **L** is length of conductor, **A** is area of cross-section, and **k** is resistivity.

Resistivity of a substance is numerically equal to the resistance of a wire of this substance one centimeter

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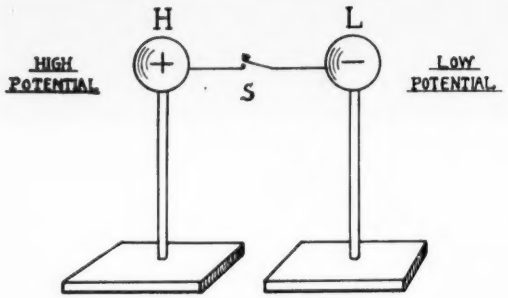

Fig. 12—Electric difference of potential

long and one square centimeter in cross-section. This is called the ohm-centimeter. However, resistivity may be expressed in many ways, a more practical one being in terms of resistance per circular mil-foot, which will be discussed more in detail later.

The reciprocal of resistivity is called conductivity and it is obvious that the best conductors have the lowest resistivity.

The next article in this series will deal with Ohm's law and some of its applications.

The Fundamentals of Electrochemistry and Electrodeposition. By Samuel Glasstone, Published by American Electroplaters' Society, P. O. Box 168, Jenkintown, Pa. 90 pages, 5¼ x 8¼ inches. Case-bound. Price $2.00.

Handsomely printed, this practical handbook presents in compact form the authentic essentials of the science of electroplating. The volume represents a compilation of a much-discussed series of articles which appeared during the past year in "The Monthly Review." The material, however, has been completely revised in the light of latest wartime developments to provide practical, daily usefulness to schools, colleges, and the serious electroplater.

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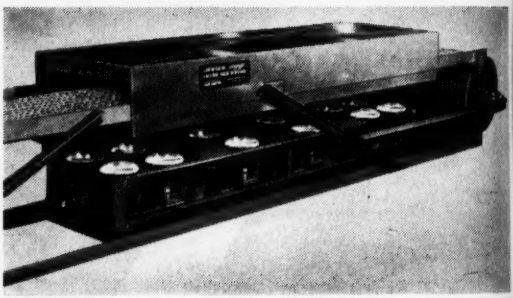

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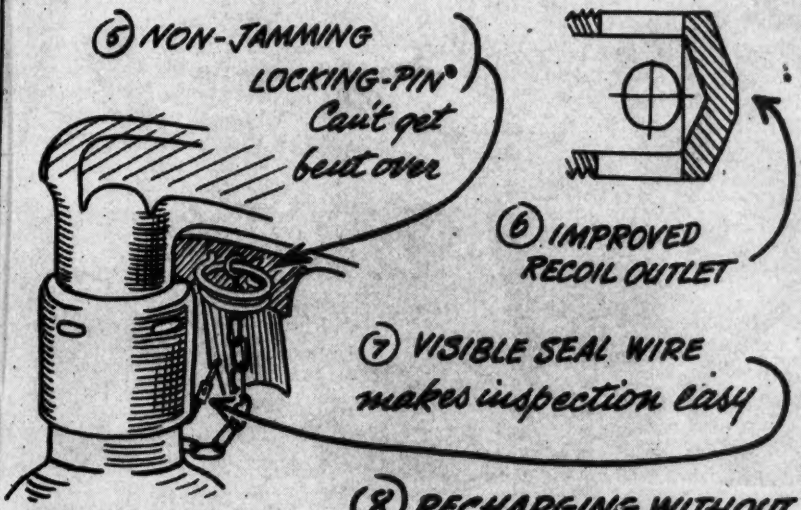
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Pre-Color Coating Metals for Small Stampings

By BURR PRICE

AMERICA'S far-famed "know how" of production, which enthralled its Allies and appalled its enemies, has its basis in thorough preparation for a given task so that the amount of work needed to produce a satisfactory result will be reduced to a minimum. Demonstrated magnificently in the war effort, this principle of preparation has been applied for some years to production for the commercial market, and the

(Above) Pre-colored metal sheets, coated and dried by a continuous coil process, were used in the fabrication of these small articles, representing only a few of the gadgets, accessories, and novelties which are now being produced in this manner.

three-letter word "per" (cross-word puzzlers know what it means) is now thoroughly incorporated in our industrial lexicon to describe classes of products and processes: pre-digested foods, pre-cooked foods, pre-shrunk shirts, pre-mixed concrete, pre-fabricated houses, and the object of this article, pre-coated stock for the metal trades. Current and potential development in the pre-coating of metals is of great interest to the industry, especially in view of the trend for the introduction of color in postwar metal products.

BURR PRICE

Forming and drawing of pre-coated stocks has been a practice in the can and closure industry for some years, and pre-plated strip in coils was available for forming and drawing purposes, however, in supplying the field of the fabricator of very small items, certain obstacles were encountered. The two biggest problems were (1) to produce at a cost which was not too high and (2) to assure flexibility of the metal and adhesion of the coating.

After one and a half years of research and several years of operation, the Enameled Metal Strip Corporation of Allentown, Pa., has solved these problems and is now supplying its customers with pre-lacquered and pre-enameled coil strip of steel, aluminum, zinc, and tin plate for such items as metal clips on paper milk bottles, envelope clasps, screw caps for bottles, indentification tags for all purposes, index tabs, shoe eyelets, shoelace tips, clips, reflectors for lamps and fixtures, handbag frames, picture frames, millinery trimmings, baggage lock sections, washboard wiring holders, Addressograph plates, and scores of other accessories and gadgets.

The strip is finished in one operation and can be supplied in several forms; namely, (1) sized, (2) with one coat, and (3) with one coat and a top coat of varnish for gloss. The strip is furnished in a wide range of colors to meet the fabricator's style line or merchandizing ideas.

The pre-coated metal is furnished on specification to customers in coils ready to feed into stamping or drawing presses, in coil weights up to 3,500 pounds, depending on the width and gauge of the stock. The process permits the handling of metal strip from 0.006 to 0.030 inch in thickness and from $\frac{3}{16}$ to 24 inches wide, with width tolerances as close as 0.0002 inch on the ordered size. The finished metal may be furnished thus in any width desired by the customer and can be subjected to stamping, bending, forming, and drawing operations without harm to the finish. Every coil is subjected to rigorous testing by the ball draw test or the screw cap test or by folding to an angle of 180 degrees. Where it is necessary to have coated edges, the strip can be furnished that way.

Founder and president of the Enameled Metal Strip Corporation is Robert A. Liebel who has been assisted in its development by Arthur E. Uhleen, vice president. Obviously, successful development of their product was dependent on the production

of baking finishes possessing outstanding adhesion, flexibility, toughness, and hiding qualities. Working closely with them in research and processing has been Herbert H. Scholz, chemist of the Murphy Finishes Corporation, formerly the Murphy Varnish Company.

The coiled strip is cleaned and degreased and bonderized, using the Bonderite K (flexible) process of the Parker Rust Proof Company, before the coating operation, which greatly enhances the adhesion of the finishing material. Although actual details cannot be given at this time, it may be said that the bonderizing and baking operations are largely vertical, while the coating is horizontal as are the coil, recoil, and slitting operations. The maximum length of the line is roughly 50 feet, with a 50-foot tower for the baking operation.

Development of the continuous coil of pre-coated metal is regarded as a logical sequence of the trend in the small stampings industry and among can manufacturers to change from flat sheets of metal to coiled strip. The steel industry was the first to change to this method of production and then the aluminum, brass, and other producers followed. This change was based on the theory that it was more economical to feed a coiled strip from a coil feed through the stamping and drawing press than to use a single sheet of cut length which must be fed by hand or by a mechanical feeder.

Manufacturers of miscellaneous small stampings have been slower to follow the lead of the can companies in the last few years, which is natural because of wartime conditions and limitation orders which created supply difficulties, such as those affecting tin and terneplate from which many of the small stampings were ordinarily made.

The availability of pre-coated coils at a reasonable figure was also a factor governing small stamping operations, especially in view of the inability of some types of finishes to withstand the stamping operation without cracking and spoiling.

Interest in pre-coated coiled strip is great, however, and unquestionably will increase in the postwar period because of the operational expense and difficulty of finishing and handling the smaller type of accessories and gadgets after they are formed. The old cumbersome methods which were nightmares to the fabricators will be superseded by the new technique, the value of which is visualized by a contrast between the two. Involved in the old methods were many steps, including degreasing tens of thousands of small fabricated items, bonderizing the same number of items, then coating by tumbling, dipping or spraying with fire hazards, storage of solvents and paints, and finally the baking operation. The new method embraces simply the stamping and drawing of the pre-coated metal, with inspection and packaging.

As previously stated, the product of the Enameled Metal Strip Corporation can be coated on one side or both sides simultaneously, and new developments have made it possible for one side to be coated with one finish and the other side with a different finish.

There are a number of interesting applications which become possible through adaptations of this process. For example, strip for containers can be coated with a weatherproof material on the outside and an acid-proof coat on the inside. Metal strip for trim can carry a brilliant hard finish on the outside and be backed up with a relatively low-cost rust-resistant coat. Through the use of

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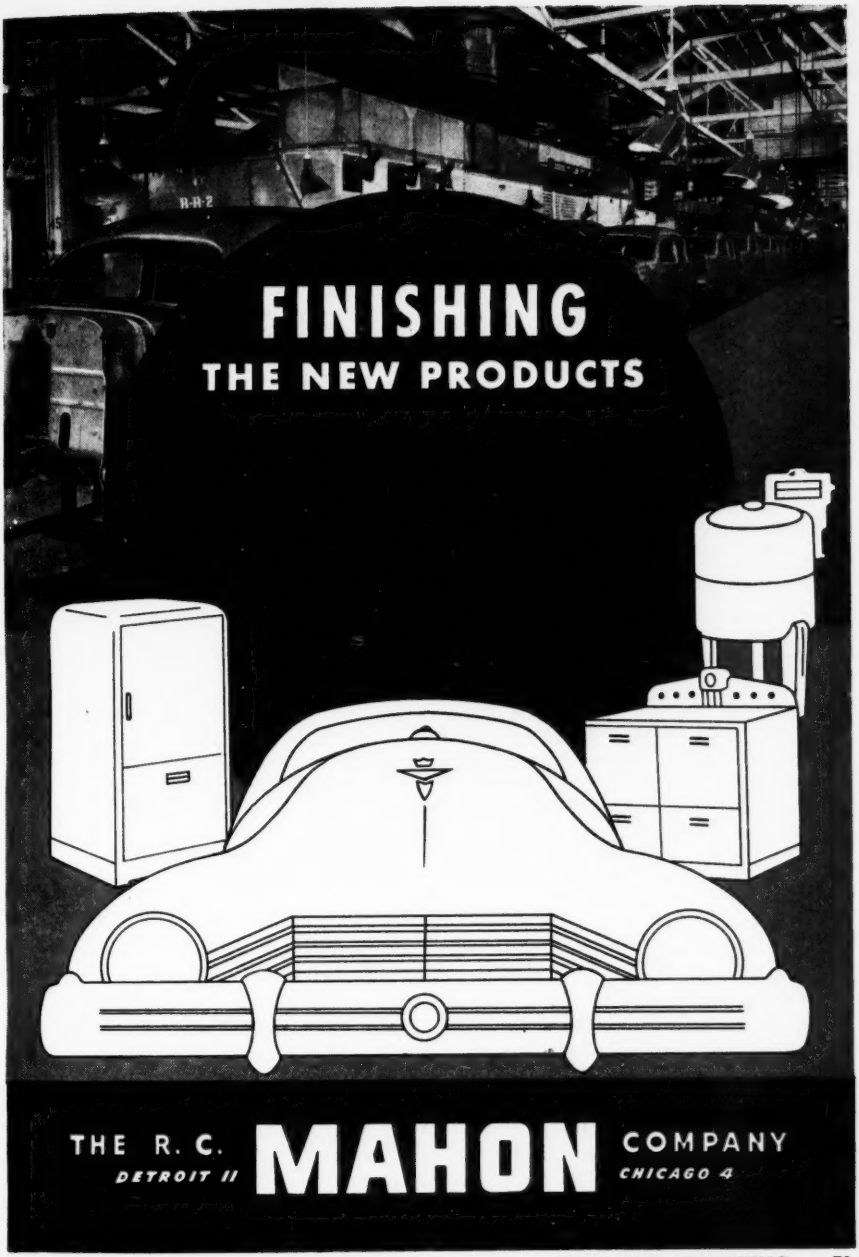
thermal-setting plastics it has been found possible to "spot-weld" small gadgets through the use of high-frequency current without disturbing the finish. The coating on the metal is made from a thermal-setting plastic, and, where two metal pieces are to be attached, such as two parts of a toy, metal trim on light fixtures, handles on small metal articles and the like, a high-frequency "heat-gun" can be used to fuse and set the plastic and form a bond between the two pieces. The strength of this bond is high enough for any normal application, and the finish shows no indication of the heating operation. As a result, pre-coated metal may be used in many small stamping assemblies which formerly required finishing after fabrication, piece by piece.

The coatings applied can range from hard, for such fabricating jobs as Venetian blind slats, to soft for draws such as those necessary on bottle caps. The 37-millimeter cap test, frequently used by cap manufacturers, has been used on this strip with complete success, according to the company.

Udylite Dipping Baskets. A bulletin containing illustrated, descriptive, and tabular information on dipping baskets which are balanced for easy handling and constructed for fast drainage so as to reduce both time and drag-out loss is now being distributed by The Udylite Corp., 1651 E. Grand Blvd., Detroit 11, Mich. Copy free upon request.

Wipe-Off Type Metalprep, a combination rust remover and metal cleaner, is described in a four-page bulletin issued by the Neilson Chemical Co., 6564 Benson St., Detroit 7, Mich. The use of the material in preparing iron, steel, aluminum, terneplate, Galvaneal, galvanized iron, and so on, for paint is explained and illustrated. Copy of Bulletin No. 45-34 free upon request.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Organic Chemistry

By C. B. F. Young, Ph.D.

Part 4

THE family of organic acids is an important one. The group which is characteristic of this important family is composed of one carbon, one hydrogen and two oxygens. It is shown below:

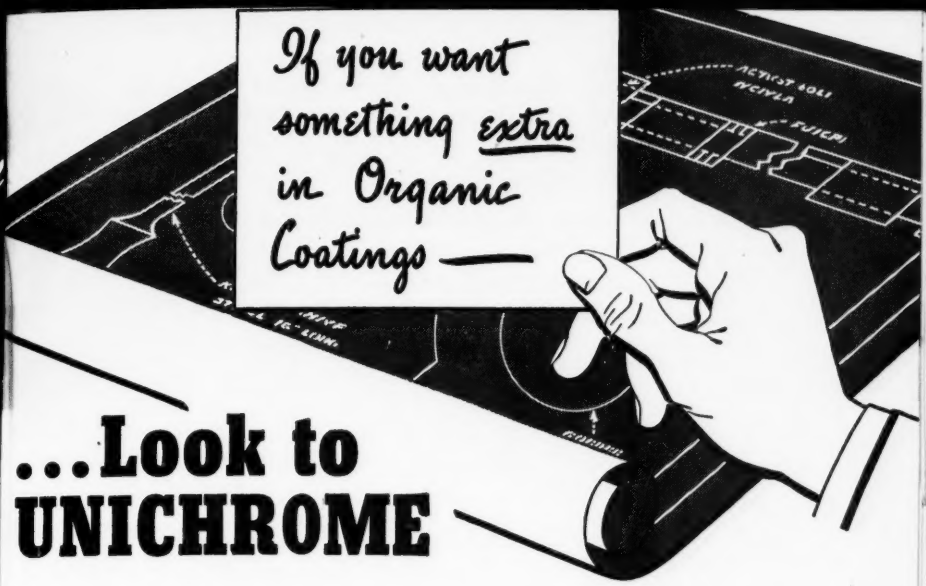
$$-\overset{\overset{O}{\|}}{C}OH$$

The Carboxyl Group

From the above one can see that attached to the carbon atom is one oxygen atom and an OH group. There is a final valence open. The simplest acid of the family is that composed of one carbon; namely, formic acid. This is taken from the Latin word formica, which means ant. This material was originally obtained by distilling the bodies of red ants. The general formula for the saturated acid family is $C_nH_{2n}O_2$. As one would expect unsaturated acids can be formed. Below is a table showing the melting point of ten fatty acids. One should keep in mind that these are all straight chain compounds and that there are a number of isomers which are not given.

Acid	Formula	Melting Point °C	Boiling Point °C
Formic	HC OOH	8.6	100.8
Acetic	CH_3COOH	16.6	118.0
Propionic	CH_3CH_2COOH	22.0	140.7
Butyric	$CH_3(CH_2)_2COOH$	— 7.9	162.4
Valeric	$CH_3(CH_2)_3COOH$	— 79.0	155.0
Caproic	$CH_3(CH_2)_4COOH$	— 5.2	205.7
Capric	$CH_3(CH_2)_8COOH$	31.3	268.4
Myristic	$CH_3(CH_2)_{12}COOH$	53.8	Decomposes
Palmitic	$CH_3(CH_2)_{14}COOH$	62.6	Decomposes
Stearic	$CH_3(CH_2)_{16}COOH$	69.3	

Organic acids give rise to the H^+ if they are soluble in water. Formic acid is the strongest acid of the series, acetic acid is next and the order decreases generally as the number of carbon atoms increase. The sodium salts of these acids give an alkaline reaction in water due to hydrolysis. Thus, sodium



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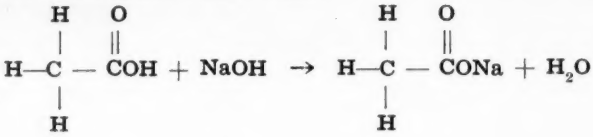
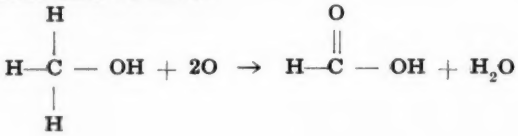
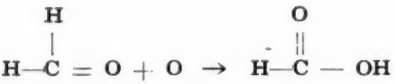
acetate is a salt which if dissolved in water produces an alkaline solution. It should be pointed out here that organic acids can be neutralized with a base the same as inorganic acids. Thus:



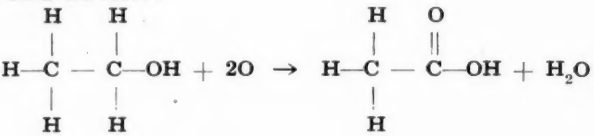
$$HCl + NaOH \rightarrow NaCl + H_2O$$

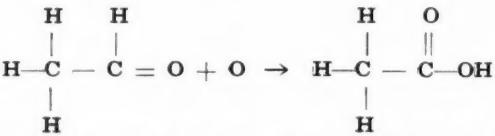
The acids are obtained by oxidizing the corresponding alcohols or aldehydes. Thus, for formic acid we have:





For acetic acid we have:





Vinegar, which is weak acetic acid, is made by oxidizing cider with air and certain bacteria called Mycoderma Aceti. In one process the aqueous solution containing 5 to 10 per cent alcohol is allowed to trickle down through a false bottom vat containing beechwood shavings which have previously been soaked in vinegar, thereby being impregnated with Mycoderma or acetic ferment. Near the bottom of the vat and in the sides are holes that permit the influx of air which passes upward and counter current to the flow of liquor. The large surface of the shavings allows the liquid to be distributed over a wide area, thereby producing intimate contact of the air and liquid which, in turn, produces good oxidation. The liquid is recycled about four times in 40 hours. This produces a vinegar having from 5 to 8 per cent acetic acid.

The first two acids mentioned in the present group, formic and acetic acid, are known and used to a fair degree. After these, the rest are generally of

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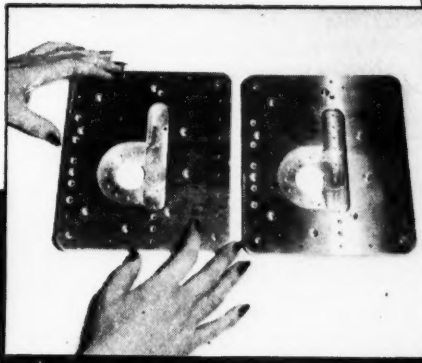

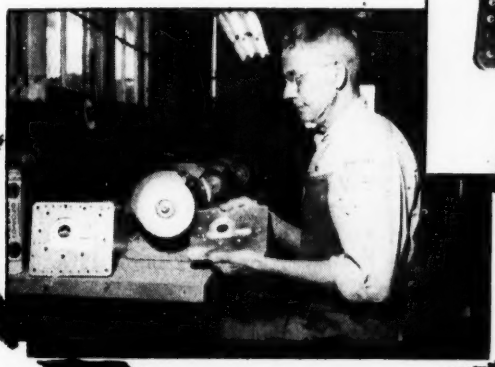

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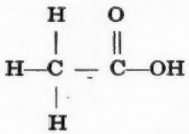
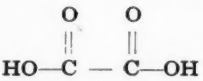
laboratory importance only until palmitic and stearic acids are reached. These are important constituents of soap. Palmitic acid, $C_{15}H_{31}COOH$, and stearic acid, $C_{17}H_{35}COOH$, are generally obtained from animal fats and tallows by treating with superheated steam. This breaks down or hydrolyses the fat, forming, along with other products, the fatty acid. If these fatty acids or fats are treated with an alkali, such as sodium hydroxide, the sodium salt of the fat is produced. This is known as saponification. In the metal cleaning field this is an important step since the fat, which is applied for lubrication purposes during the fabrication of the metal, must be rendered soluble or floated off in order to obtain a chemically clean surface. One of the best ways to do this is to add sodium hydroxide (caustic soda) or alkaline sodium salts, such as sodium carbonate. These unite chemically with the fat, thereby producing the corresponding salt of the fatty acid, which is soluble in water. The fat is removed from the surface of the metal.

Heretofore the acids mentioned have contained only one carboxyl group, —C(=O)—OH, for instance acetic acid:



If more than one carbon is present it is possible to have more than one carboxyl group. These are generally termed polybasic or polycarboxylic acids. The simplest of these is oxalic acid which is dibasic and has the following structure:



This material occurs in nature in many plants as the sodium or potassium salt. It can be produced by completely oxidizing the two carbon hihydroxy alcohol, glycol. Below is a list of some normal dicarboxylic acids.

Acid	Formula	M. P. °C.
Oxalic	HOOCCOOH	187
Malonic	$HOOC\,CH_2\,COOH$	133
Succinic	$HOOC(CH_2)_2\,COOH$	187
Glutaric	$HOOC(CH_2)_3\,COOH$	98
Adipic	$HOOC(CH_2)_4\,COOH$	153
Pimelic	$HOOC(CH_2)_5\,COOH$	105.5
Sebacic	$HOOC(CH_2)_8\,COOH$	135

It should be kept in mind that as the number of carbon atoms increase, the number of isomers also increase. For instance, there are eight isomers of sebacic acid known.

Oxalic acid is found in certain plants as the potassium acid salt and is the simplest of the dicarboxylic acids. The material can be oxidized to CO_2 and H_2O quantitatively with oxidizing agents, for instance permanganates. The acid is used in quantitative analysis for this reason.

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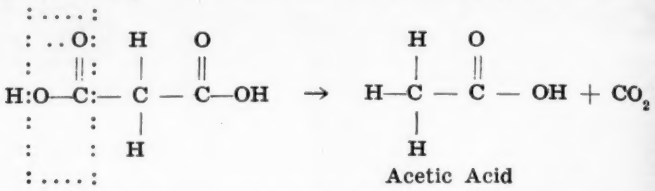
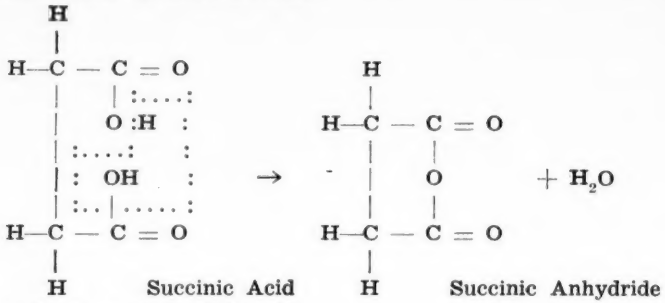
Malonic acid loses CO_2 when heated above its melting point. Thus:



Acetic Acid

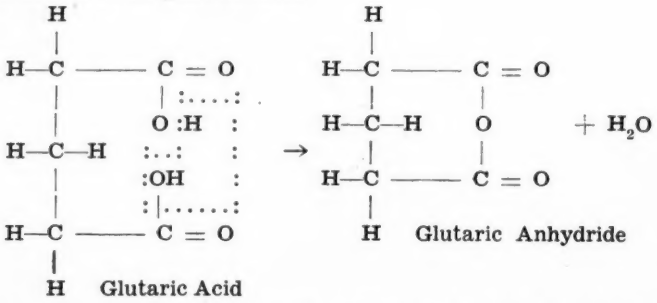
A general rule in organic chemistry is that two carboxyl groups connected to the same carbon atom produce an unstable system and one such group is usually broken up forming among other products CO_2.

Succinic acid occurs in amber. This acid will form an inner hydride (lose a molecule of water) as shown below. This reaction is typical of dibasic acids which contain four or more carbons.



Succinic Acid — Succinic Anhydride

This is also true of glutaric acid:



Glutaric Acid — Glutaric Anhydride

The anhydrides produced are more stable as the number of carbon atoms increase. However, they can be hydrolysed (water will add to the anhydride,

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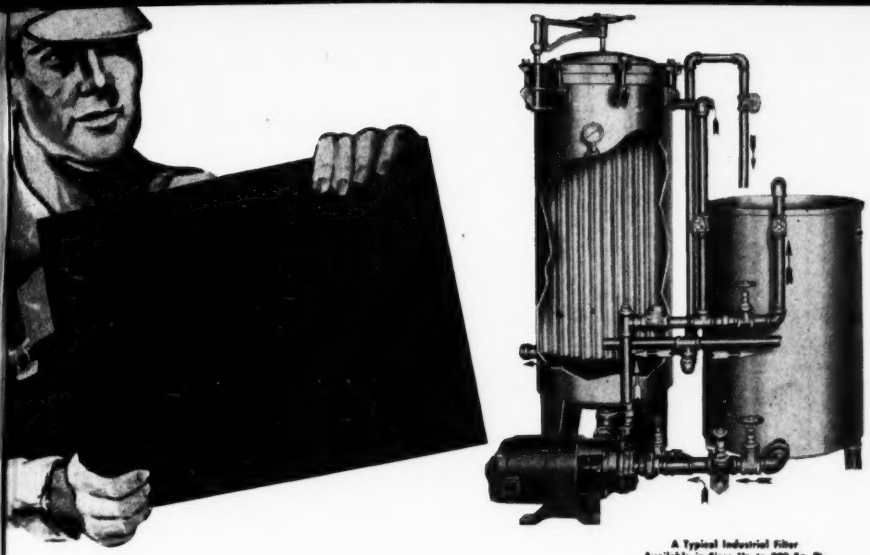

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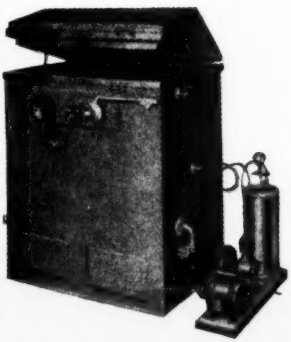

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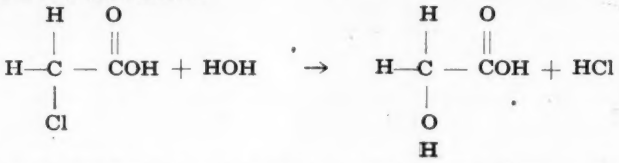
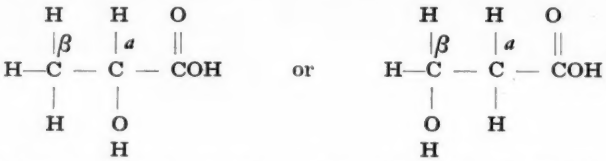
thereby producing the opposite reaction shown above) and produce thereby the corresponding acid.

Hydroxy Acids

In nature acids frequently occur which have an OH group on carbon other than that of the carboxyl group. The simplest of these is hydroxyacetic acid and can be made as follows:



This material has been found in unripe grapes. The three carbon hydroxy acid is known as hydroxypropionic acid and can have the formulas shown below:



If the hydroxy group is on the carbon next to the carboxyl group, it is known as *a* hydroxypropionic acid. *a* is the first letter of the Greek alphabet. If this group is on the second carbon from the carboxyl group, it is known

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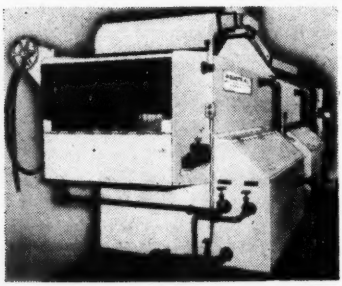

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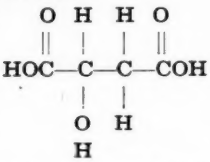
as β hydroxypropionic acid, and so on. β is the second letter of the Greek alphabet. Lactic acid is the α variety.

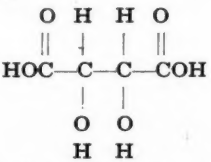
At this point it should be stated that the optical activity of the two forms of lactic acids differ. This is true of many compounds. This is spoken of as the optical activity and is due to the structural differences of the molecules. In the present study, space does not permit a discussion of this interesting property. For those who are interested, a discussion of this subject will be found in any good organic text.

Lactic acid is used in the dyeing industry as iron, zinc and antimony salts. The material can be made from sugar by fermentation.

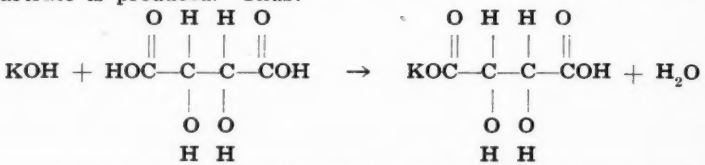
Malic or hydroxysuccinic acid is widely distributed in the vegetable kingdom. It has the following structure:



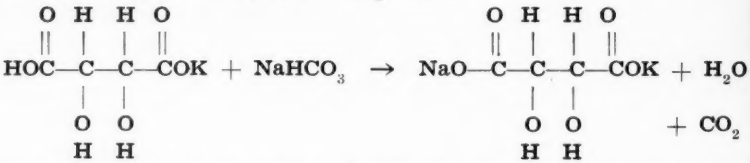
Another very important acid in the vegetable kingdom is tartaric acid and has the formula shown below:



This acid is fairly strong as it will liberate carbon dioxide from carbonates. If one carboxyl group is neutralized with KOH, cream of tartar or potassium acid tartrate is produced. Thus:

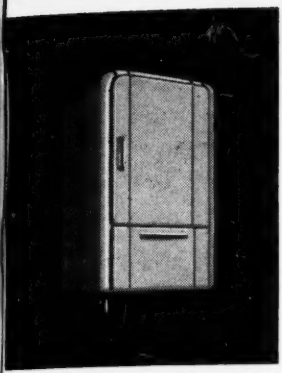


This material is used in baking powders along with sodium bicarbonate. These two react together to produce CO_2. Thus:



Sodium potassium tartrate when crystallized with four molecules of water is known as Rochelle Salts which is important in copper plating baths.

Citric acid is a very important material occurring naturally in many fruits. It is a monohydroxy tricarboxylic acid having the following formula:



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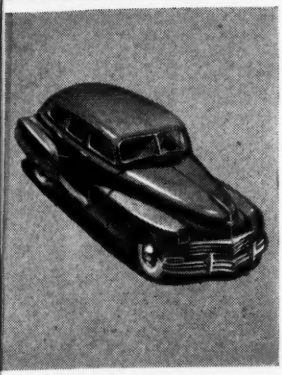

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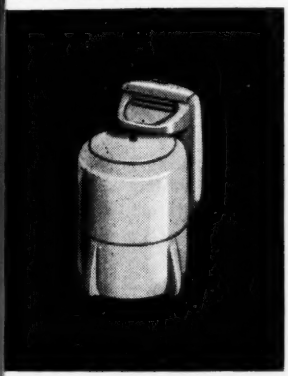
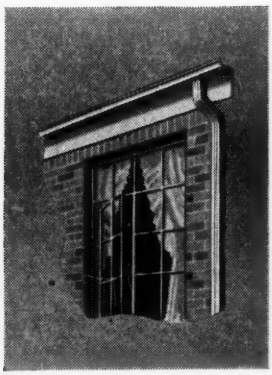
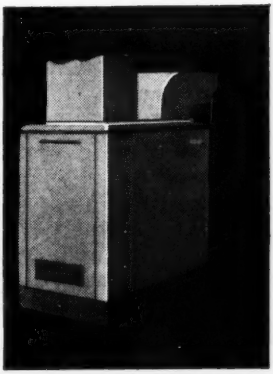
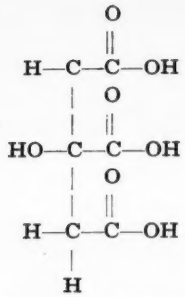




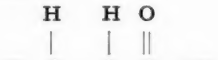
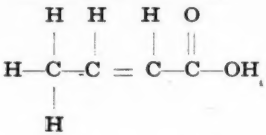
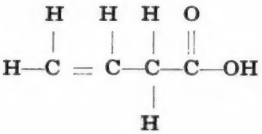
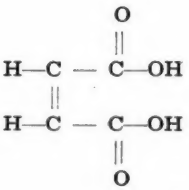
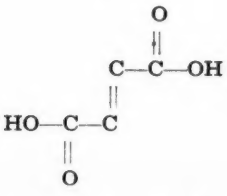
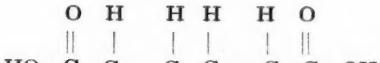


BONDERIZING · **PARKERIZING** · **PARCO LUBRIZING**
HOLDS PAINT TO STEEL — INHIBITS RUST — RETARDS WEAR

PARKER PRODUCTS CONQUER RUST



So far only the saturated acids have been mentioned. There are a number of materials as one would expect that are unsaturated or have double bonds present in their structure. A list of some of these is given below along with their formulas and melting points.

		M. P. °C
Acrylic acid		12
Crotonic acid		72
Vinyl acetic acid		39
Maleic acid		130.5
Fumaric acid		287
Muconic acid		298 Dec

• Use the Magnus Cleaner best suited to the job, but use the right kind of *agitation* during cleaning as well!

The Magnus Aja-Dip Cleaning Machine

provides a many times repeated, vigorous "swishing" contact of the solution with *all* parts of the work. Cleaning action is intensified, and far better, faster cleaning is obtained, with an invariable reduction in manual labor and handling.

Cleaning After Heat Treating

The Magnus Aja-Dip Cleaning Machine shown above is used to clean semi-finished aircraft parts, tools and dies after heat treating.

Formerly this company attempted to get a physically clean surface by overnight soaking in a cleaning solution, followed by pickling and sand blasting. Results were not satisfactory, and considerable production trouble was experienced due to poor cleaning. In the Magnus Aja-Dip Machine, using Magnus No. 731, *500 parts an hour* are thoroughly cleaned, without pickling or blasting, and without any subsequent production difficulties.

Give us details of the cleaning job that most needs improvement in your plant and let us make recommendations.

MAGNUS CHEMICAL COMPANY
208 SOUTH AVE. GARWOOD N. J.

MAGNUS Cleaners • Machines

Acetylene dicarboxylic acid $HO-\overset{O}{\overset{\|}{C}}-C \equiv C-\overset{O}{\overset{\|}{C}}-OH$ 179

Oleic acid $CH_3(CH_2)_7CH = CH(CH_2)_7-\overset{O}{\overset{\|}{C}}OH$ 14

Linoleic acid $CH_3(CH_2)_4CH = CHCH_2CH = CH(CH_2)_7\overset{O}{\overset{\|}{C}}OH$ 11

Linolenic acid $CH_3CH = CHCH_2CH = CHCH_2CH = CH(CH_2)_7\overset{O}{\overset{\|}{C}}OH$ —

In the above list oleic acid should be pointed out as being industrially important. It can be purchased in large volumes and is regularly purchased by the tank car. The material is a by-product of the packing house industry. It is used to make esters, soaps, amines, amides, lubricants, greases, paints, plastics, and so on.

At this point a new source of raw material, it should be pointed out, has recently received quite a bit of attention. This material is primarily an acid and is known as Tall Oil. It is obtained from paper mills using the sulphate process for digesting Southern wood such as the Slash, Loblolly and Long Leaf pine. In reality the material is the sap of the pine tree and is obtained from these mills as the sodium salt. If acidified and purified a refined material

Having Trouble Removing the Paint?

USE FIDELITY

Stripping Compounds

If you've been using ordinary strippers, your workers too may have been tempted to pick up hammer and chisel and take a whack at those paint spots that won't come off.

To speed up stripping operations in your plant, give your men materials they can depend upon to do the job thoroughly. Call in a Fidelity service engineer and let him recommend the right compounds for your requirements.

FIDELITY CHEMICAL PRODUCTS CORP. 430 RIVERSIDE AVE. NEWARK 4, N. J. HUmbolt 3-3640

"Serving industry with cleaning and stripping compounds"

a new discovery
ins rust from steel?

YES, THERE *is* such a discovery. It is CORRONIZING, a phenomenal new alloy "armor" for steel that may soon bring you washing machines, automobiles, water heaters, tools, dozens of steel products with up to *4 times longer life* than any you've ever owned!

The reason? CORRONIZING can defy every possible source of corrosion and far *outlast other rust-protective coatings.* This has been proved by hundreds of scientific tests and actual use in the war, in every kind of climate.

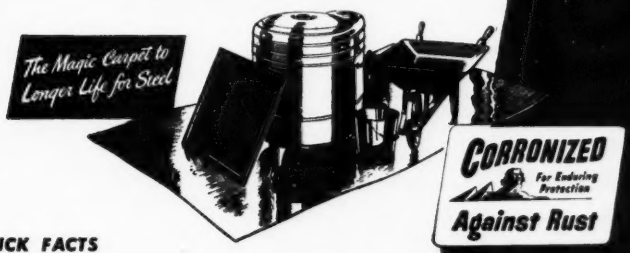
Soon America's more progressive manufacturers and retailers will be able to bring you products with the sensational advantages of "Corronized" steel. Motor car makers—always in the forefront of progress—may be among the first to bring you CORRONIZING, in the new model cars.

Thanks to CORRONIZING, you will be able to get up to *4 times the service for your money* in the wonderful new products made of steel!

Standard Steel Spring Co.

ORIGINATORS OF

CORRONIZING



QUICK FACTS

***CORRONIZING** provides a permanent alloy "armor" with 5 layers of defense against corrosion! It becomes part of the steel base . . . can be worked in any manner. Permits using lighter materials by prolonging steel's period of greatest strength. Write for samples and complete information.*

STANDARD STEEL SPRING COMPANY

CORAOPOLIS, PENNSYLVANIA

can be produced having the following typical approximate analysis:

Fatty acids calculated as oleic acid	49.52 per cent
Rosin acids calculated as abietic acid	42.21 per cent
Sterols, higher alcohols, and so on	8.50 per cent
Moisture	0.50 per cent
Viscosity, Saybolt Univ. 210 deg. F.	116
Flash point (Cleveland open cup)	350 deg. F.
Acid number	171.9
Saponification value	173.9

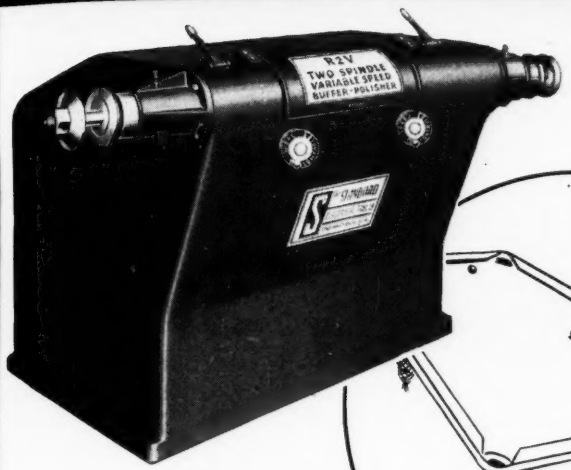
This material is finding a great deal of uses. Below is a table showing some of these.

INDUSTRIAL USES OF TALL OIL

	Adhesives	Binders	Cleaners	Core oils	Curing	Cutting oils	Disinfectants	Drawing oils	Drying oils	Dust layers	De-emulsifiers	Emulsifiers	Esters	Fatty acids	Flotation agent	Grinding	Herbicides	Higher alcohols	Insecticides	Inks	Impregnating	Lubricants	Plasticizers	Polishes & waxes	Resins	Rust inhibitors	Sizings	Soaps, cleaning	Soaps, metallic	Softening	Scouring agents	Sulphonated oil	Sulphurized oil	Varnishes	Water proofing	Wetting agents
AGRICULTURE	✓					✓			✓		✓					✓			✓								✓									
ASPHALT											✓											✓													✓
CATTLE						✓					✓								✓								✓									
CEMENT & CONCRETE		✓	✓		✓				✓	✓				✓	✓												✓							✓		
BUILDING SUPPLIES											✓									✓		✓				✓							✓	✓		
CHEMICAL											✓		✓	✓			✓																			✓
ELECTRICAL	✓								✓			✓		✓						✓		✓		✓									✓	✓		
EMBALMING																							✓												✓
FOUNDRY		✓	✓	✓								✓																								
GREASE													✓								✓				✓			✓			✓					
HAT																										✓										
INK & DYE MFG.									✓				✓						✓			✓											✓			
JEWELRY MFG.			✓												✓												✓						✓			
LEATHER				✓								✓									✓						✓			✓		✓				
LINOLEUM & OILCLOTH								✓				✓	✓						✓		✓		✓													
METAL WORKING			✓			✓		✓		✓	✓	✓		✓							✓		✓		✓		✓				✓	✓				✓
METAL CLEANING			✓																								✓					✓				✓
MINING									✓				✓								✓															✓
NURSERIES										✓					✓		✓																			✓
OIL WELL DRILLING																					✓															
PAINT									✓		✓	✓	✓									✓		✓									✓	✓	✓	✓
PAPER	✓																	✓	✓		✓	✓	✓	✓		✓						✓		✓	✓	✓
PAPER COATING											✓								✓		✓	✓	✓	✓								✓	✓			✓
PLASTIC												✓										✓		✓												
PRINTING																			✓														✓			✓
ROAD BUILDING				✓				✓	✓		✓																			✓						✓
RESIN	✓											✓	✓									✓		✓												
RUBBER				✓								✓																		✓			✓			
SOAP—DISINFECTANT																											✓								
" JANITOR																											✓								
" LAUNDRY																											✓								
" METALLIC							✓																					✓				✓			
" TEXTILE			✓																													✓			✓
" TOILET																																			
STEEL			✓			✓		✓						✓							✓				✓		✓					✓				✓
TEXTILE—COTTON										✓										✓	✓				✓		✓		✓		✓	✓	✓	✓	✓
" RAYON										✓										✓	✓				✓		✓		✓		✓	✓	✓	✓	✓
" SILK										✓										✓	✓				✓		✓		✓		✓	✓	✓	✓	✓
" THREAD										✓										✓	✓				✓		✓		✓		✓	✓	✓	✓	✓
" WOOL										✓										✓	✓				✓		✓		✓		✓	✓	✓	✓	✓
TUBE MFG. METAL			✓			✓		✓		✓					✓											✓						✓			
VARNISH & LACQUER											✓	✓										✓		✓										✓	✓
WIRE MANUFACTURERS							✓													✓					✓										

(Courtesy National Southern Products Corp., New York, N. Y.)

BUFFING AND POLISHING MACHINES



TYPE R2V
Each spindle independent of the other.

"Call your Shot!"

The Standard Infinitely Variable Speed Buffer and Polisher with its ***Speedial*** Control gives you any spindle speed from 1500 to 3000 R.P.M. ***instantly!*** 8 models from 1 H.P. to 15 H.P.

Call your shot! Write today for complete information.

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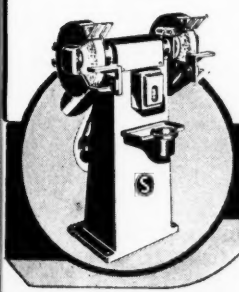
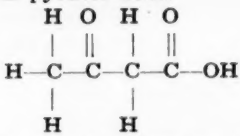
- Gives you maximum usable wheel life.
- Lower production costs.
- Higher Production.



The STANDARD ELECTRICAL TOOL Co.
CINCINNATI · 4 · OHIO
2518 RIVER ROAD

Ketonic Acids

These acids as one would expect contain the ketone group; namely, —C(=O)—. The simplest one is pyruvic acid:

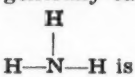


There are a number of other acids belonging to this class but none are of commercial importance and a discussion of them will not be given here.

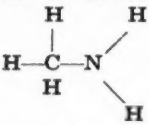
Suffice it to say that in addition to the reactions of the carboxylic group, namely —C(=O)—OH, the materials also react as ketones as one would expect.

Amino Acids

In the process of life from the point of view of chemistry there are no compounds more important than that group made up of amines and acids, generally called the aminoacids. An amine is a compound of ammonia. Thus

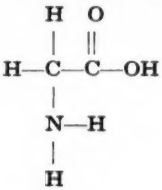


is ammonia. If a CH_3 group is substituted for a hydrogen, we have

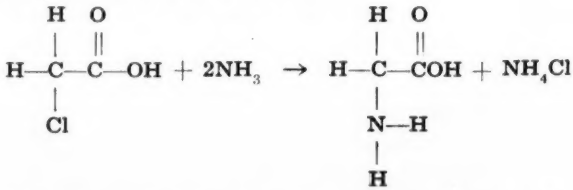


which is methyl amine. It can be seen that the nitrogen present can take on three CH_3 groups. These compounds will be discussed later.

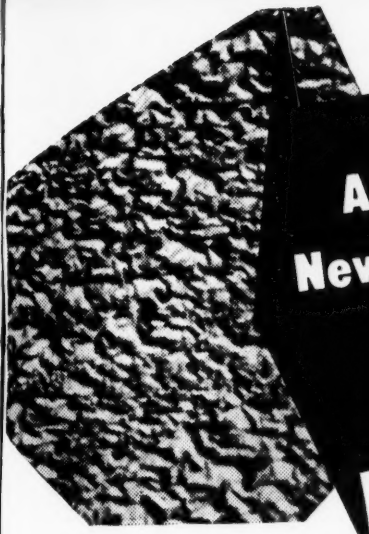
A good example of this type compound is amino acetic acid.



This material can be formed as follows:



As one would expect there are a number of these compounds and the field is entirely too complicated to attempt to study here. However, several factors will be brought out about this interesting group. Amino acids can be



An Outstanding New Development in

Photo shows paint treated with Paint-Gon ready to be hosed off

Paint-Gon easily and safely removes any number of coats of paint in from 5 to 20 minutes. The condition of the finish makes no difference, nor does the condition of the surface from which the paint is to be removed.

Turco Paint-Gon is safe for metal, wood, aluminum, magnesium, steel, cadmium, iron, zinc or galvanizing. It will neither warp nor raise the grain of wood. It is effective on all types of coating—paint, enamel, baked enamel, varnish, lacquer, synthetic enamel, air-dry synthetic enamel and other stubborn finishes.

Paint-Gon is applied by brushing, scrubbing or spraying. It clings well to vertical surfaces, is non-inflammable, and can be flushed away with water. It is exceptionally free rinsing. Write for data. Dept. **P.F.-9.**

TURCO

INDUSTRIAL CLEANING COMPOUNDS

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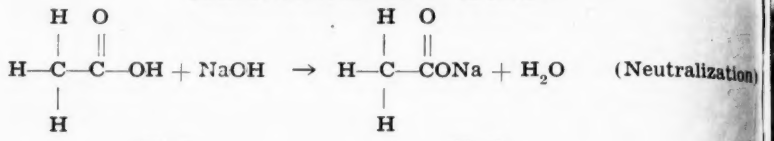
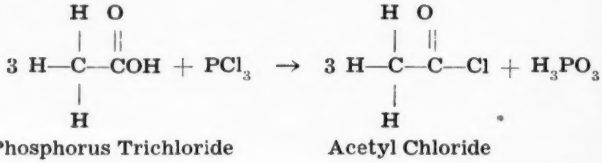
Offices and Factories: 125 W. 46th St., Chicago 9 • 1606 Henderson St., Houston 1, Texas
New York Office: 415 Greenwich St., New York 13 • *Offices and Warehouses in All Principal Cities*

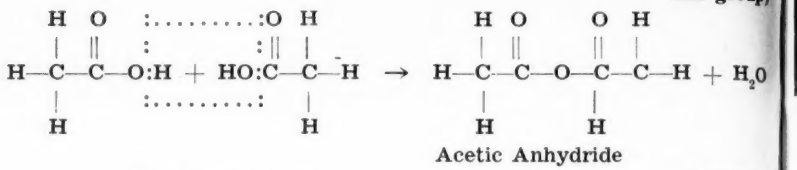
obtained from proteins by boiling in either an acid or alkali solution. This can also be accomplished by the actions of enzymes. The latter takes place in the digestive tract of animals. Suffice it to say that biologically speaking this is an important group of compounds.

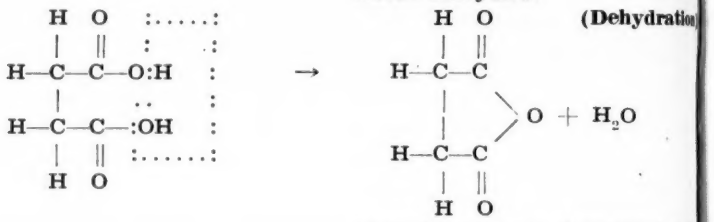
Characteristic Reactions of Acids

1. 

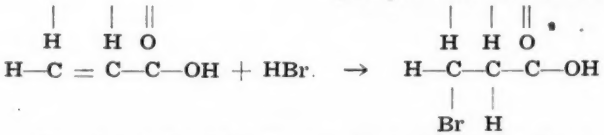
2. 

(Removing the OH group)

3. 

4. 

(Dehydration of a dicarboxyl acid)

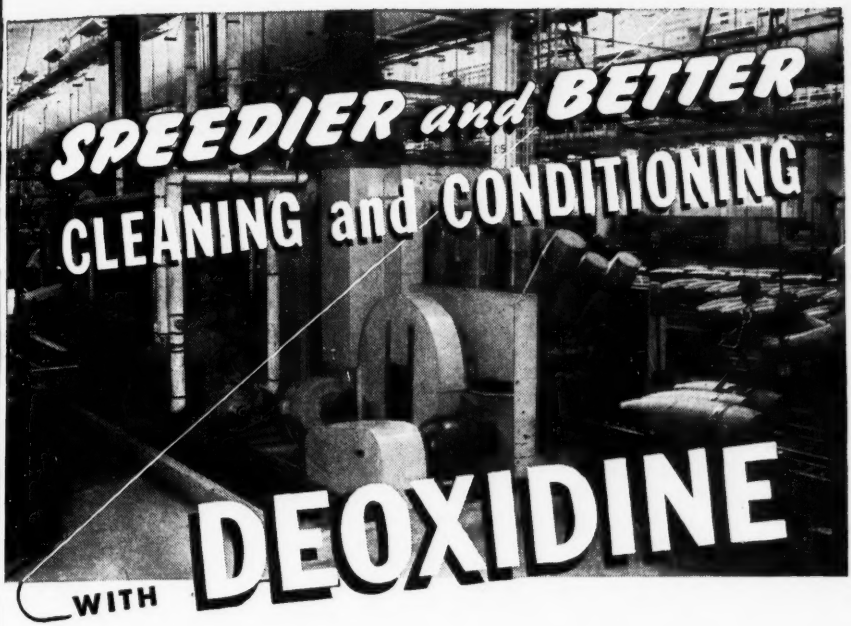
5. 

(Unsaturated acids add compounds readily at the double bond)

The author would like to thank Mr. W. Jordan Withrow of The City College, New York, for checking the manuscript.

(To be continued)

Mattison Abrasive-Belt Backstand Idler for converting the regular grinding and polishing lathe to the use of factory-coated abrasive belts is the subject of a circular prepared by the Mattison Machine Works, Rockford Ill. Copy free to mechanical executives upon request.



War's demands for rapid production in the early, critical days of our participation led to the simplification and speeding up of metal cleaning methods and the preparation for protective paint.

Today, DEOXIDINE cleaning processes far exceed the best prewar metal cleaning and conditioning practices.

DEOXIDINE cleans and prepares for paint at the same time — eliminating the necessity for a special conditioning treatment — a material saving in time and cost of operation.

The detergent properties of DEOXIDINE are excellent and, being acidic, eliminate the danger of leaving paint removing or paint-bond destroying alkali residue on cleaned metal surfaces.

There are grades of DEOXIDINE suitable for application by spray, dip or brush and for cleaning various alloys and varying amounts of rust and soil.

In planning now for postwar reconversion, economy of operation is essential to meet forthcoming competition. ACP Technicians will gladly cooperate with you in developing an efficient and economical set up for metal cleaning and conditioning. Technical Service Data Sheets on DEOXIDINE sent on request to Dept. ***A-10.***

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Safe Use of Solvents

By LILLIAN GORDON
Safety Research Institute, Inc., New York, N. Y.

THE safe use of solvents requires an evaluation of the hazards involved, the introduction of proper engineering and medical controls, and the education of management and worker in the use of these controls.

Hazards in the use of volatile solvents are of two main types—fire and health. In terms of loss of life and property, fire is the more important of the two. In 1942, according to a report of the National Fire Protection Association, there were 25,000 fires, involving a loss of $8,500,000, attributable to flammable liquids.

With the exception of the chlorinated hydrocarbons, all of the highly volatile solvents are fire hazards. Their flammability is a function of ignition temperature, flash point, volatility, vapor density, and lower explosive limit. Underwriters' Laboratories have classified the common solvents according to fire hazards, from 0 for non-flammable solvents to 110 for the most highly flammable. This classification is indicated in the accompanying table.

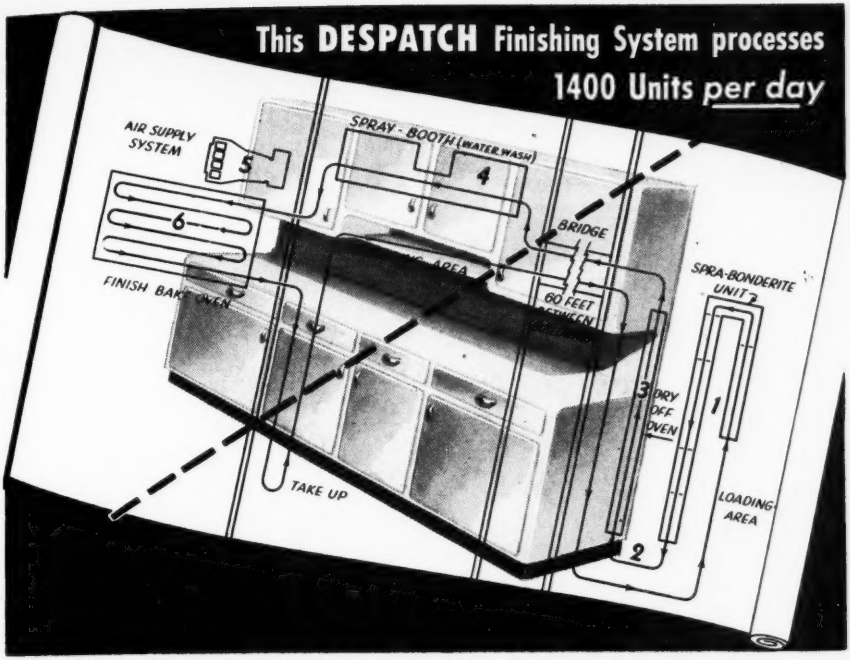
Among the most fire-hazardous of the solvents used in the finishing field are carbon disulfide, ether, petroleum ether, benzine, gasoline, benzene (benzol), acetone, ethyl acetate, cyclohexane, methyl acetate, isopropyl ether, butyraldehyde, and solvent naphtha. Non-inflammable liquids which are used as solvents include methylene chloride, trichlorethylene, carbon tetrachloride, and tetrachlorethylene (perchlorethylene). Intermediate in flammability are the alcohols, toluene, xylene, kerosene, turpentine, Stoddard's Solvent, the higher acetates and ethers.

Effects of volatile solvents on health may result either from inhalation of vapor, to give systematic poisoning, or from skin contact, to give dermatitis.

In addition to causing anesthesia when inhaled in sufficient quantities, organic solvents exert systematic effects by attacking some organ after absorption into the body. The body has considerable power to throw off absorbed poisons, either through excretion by the lungs or kidneys, or detoxification by the liver. Therefore, in most cases of acute exposure, unless too prolonged, no permanent damage is done to the body. It is only in rare cases of accident or easily avoidable carelessness that sufficiently severe poisoning occurs to result in immediate death or serious illness.

Chronic poisoning, however, is a more complex problem. This occurs when the amount of vapor inhaled is insufficient to cause anesthesia or other immediate ill effects, but is large enough to be harmful when daily exposures are repeated for long periods of time. In these cases, the body is given insufficient opportunity to throw off the vapors and a cumulative effect follows. Symptoms at

This DESPATCH Finishing System processes 1400 Units *per day*



Difficult Space Problem Solved by DESPATCH Engineers

Utilizing 2 buildings, the roof of a third and crossing a 60 ft. street, Despatch engineers designed and installed this endless conveyor finishing system that produces 1400 units per day. The conveyor alone is over 1000 ft. long.

SINGLE PLAN—SINGLE RESPONSIBILITY

This manufacturer got a complete finishing system that cuts costs to a minimum by having Despatch specialized engineers do the entire job of designing and installing the system to fit his production requirements and plant facilities.

You too, can profit by having Despatch engineers take the full responsibility for planning and installing your finishing system. Then you get space saving lay-out—efficient conveyor route—proper selection and arrangement of component parts to make a unified system that gives maximum production at a minimum cost.

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All of the equipment for this new finishing department was planned, selected and installed by Despatch engineers. Individual items, numbered to correspond with the floor plan, include

1. SPRA-BONDERITE UNIT—A 6-stage unit.

2. AIR BLOW-OFF—Removes surplus moisture.

3. DRY-OFF OVEN—Dries completely following Bonderizing.

4. SPRAY BOOTH—Water wash type, working length 50 feet.

5. AIR SUPPLY UNIT—For supplying air to spray booths.

6. BAKE OVEN—Despatch direct gas-fired oven, approximate length of travel 225 feet.

Work stays on same monorail conveyor; eliminates manual handling.

DESPATCH OVEN COMPANY
619 SE 8th Street, Minneapolis 14, Minn.

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☐ Please survey our plant without obligation and recommend new equipment for our Finishing Department.

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OVEN COMPANY MINNEAPOLIS 14 MINNESOTA, U.S.A.

TABLE OF HAZARDS OF SOLVENTS

Solvent	M.A.C.* (p.p.m.)	Underwriters' Laboratories Flammability Rating	Flash Pt. (°F.)
Acetone	200 (Cal., Colo.)	90	0
Amyl alcohol		35-40	114
Amyl acetate	400	55-60	77
Benzene (benzol)	100 (A.S.A.)	95-100	-4
Benzine and gasoline	1,000**	95-100	0
Butyl alcohol (secondary)	100 (Cal.)		82
Butyl acetate	400 (Cal., Mass.)	55-60	72
Carbon disulfide	20 (A.S.A.)	110	-22
Carbon tetrachloride	100	0	None
Cyclohexane			1
Cyclohexanol			154
Dichlorethylene			57
Diethylcellosolve			95
Ethyl acetate			24
Ethyl alcohol	250 (Cal., Colo.)	70	55
Ethyl ether	400 (Cal., Mass.)	100	-49
Ethylene dichloride	100		58
Isopropyl alcohol		55-60	59
Kerosene		40	100-165
Methyl acetate			14
Methyl alcohol	200	70	52
Stoddard's Solvent	**	30-40	100-110
Tetrachlorethane	10	0	—
Tetrachlorethylene	200	0	—
Toluene	200 (A.S.A.)	75-80	40
Trichlorethylene	200	1-2	—
Turpentine	200	40-50	95
Xylene	200 (A.S.A.)		63

*The figures given are as recommended by the Division of Industrial Hygiene, U. S. Public Health Service, unless otherwise indicated, and represent maximum allowable concentrations in the atmosphere for continuous (8-hour daily) exposure, in terms of parts of vapor per million parts of air. A.S.A." following certain of the figures indicates the limit established by the American Standards Association. Some states have set their own limits which must, of course, be observed in those states.

**Petroleum solvents may be classified as to health hazard in the following order: naphtha, gasoline, Stoddard's Solvent, F-140, the most toxic being listed first.

first are mild; headache, nausea, dizziness, gastric disturbances, fatigue, and mental disturbance are the usual early signs of most chronic poisoning. Meantime, the chemicals may attack the nerves (alcohols, ethers, aldehydes, ketones, certain esters, benzene), the blood (benzene), the liver (chlorinated hydrocarbons) or the kidneys (glycols, tetrachlorethane). If these symtoms are unheeded, serious illness and death may follow. If promptly recognized, and the condition corrected so that the worker is no longer exposed to harmful amounts of the vapor, complete recovery is the usual result.

The maximum concentration of solvent vapor in the air which is generally considered safe for continous exposure is usually expressed in terms of parts of vapor per million parts of air (by volume), or p.p.m. The accepted limits are given in the table in the column headed "M.A.C." (i. e., maximum allowable concentration).

Repeated or prolonged contact with solvents or their vapors often causes skin difficulties Sometimes this is due to the defatting action of the vapor or liquid, which causes drying, cracking and fissures, followed by infections. In other cases, there may be an allergic reactions, or sensitivity, which results in dematitis.

NEW Synthetic Base Fluids

ONE WASHING REMOVES SOIL OF ALL TYPES . . . STOPS RUST

● Solventol No. 27—has now been adopted by most of the major munitions and parts manufacturers.

● Used with 40 parts of water—it not only removes greases, compounds, abrasives, red lead, chips and other inerts to a new degree of perfection—but it temporarily conditions the surfaces of all metals against rust, corrosion and hand soiling.

● One fast stage of spray washing—with light air blowoff—is usually enough!

● No. 27 can be used in most standard washers—or our complete engineering service will design faster streamlined units for you.

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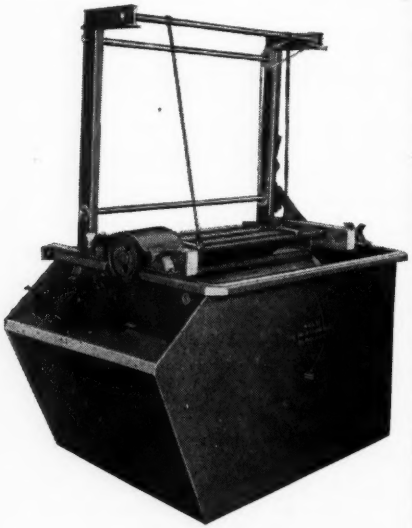
SAVINGS in both Manpower and precious Time . . . by using a unit with OUTSTANDING FEATURES! Permits heavy loads . . . all conductors, tanks, rods, connections and switches have ample current carrying capacity . . . Cylinders constructed from heavy laminated bakelite are standard in all barrels.



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Handling Solvents Safely

The axiomatic principle of the handling of solvents may be stated as follows: All solvents may be handled with safety if the proper engineering and medical controls are employed. Or, as a corollary, "Practically all air contaminants are toxic if the concentration is high enough," as stated by the U. S. Public Health Service.

The first step in the safe handling of solvents must be the evaluation of the hazards involved. Chemicals analysis is important, because there is always the possibility of some dangerous impurity in an otherwise safe solvent, or the possibility that the ingredient of a mixture designed to lower its flammability has evaporated, with consequent increase in the fire hazard.

Once the fire hazard, in terms of flash point, and so on, and the health hazard, in terms of maximum allowable concentration, have been determined, the next step is the analysis of the air by a competent chemist to determine whether a safe concentration is being exceeded. A compilation of methods for such analysis is available in a bulletin entitled "Industrial Air Analysis," issued by the Division of Industrial Hygiene of the New York State Department of Labor.

Anaylsis of the air near danger spots, such as spray booths or degreasing tanks, is important, as well as the determination of the general vapor content of the room. If natural ventilation does not keep the vapor concentration below dangerous levels, a ventilation system designed to meet specific conditions of the operation must be installed.

In the finishing industry, ventilation is important not only from the point of view of fire and health hazards of solvents, but because other products in the air, such as many condensation products from phenol

The Fast, Effective Method of INSULATING PLATING RACKS

MICCROTUBE on the Contact Wires

Miccrotube, the new, extruded plastic-base tubing, is quickly and easily applied to almost any type of straight or bent contact wires. Its physical characteristics provide exceptional insulating qualities, and its smooth, glossy surface minimizes dragout of solutions. Available in inside diameters from 1/16" to 1".

MICCROTAPE on the Splines

Miccrotape is an extruded tape, with tapered edges which makes it extremely easy to apply and permits much smoother overlapping and fitting into corners. It has unusual properties of dielectric strength, elasticity and tensile strength. Used in combination with Miccrotube, the two materials can be fused by heating to provide an integral coating.

A new six page bulletin provides complete information on Miccrotape and Miccrotube used both for insulation of plating racks and for masking parts prior to selective plating. Full details on physical characteristics, methods of application, and prices are included. Your copy will be mailed you immediately upon request.

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and formaldehyde, the bakelites, and so on, are also dangerous as are fumes of acids and alkalies.

Where ventilation systems are to be installed, it is desirable to obtain the expert advice of a ventilating engineer. Many state agencies can also be helpful in this connection. In New York State, for example, the Plan Examination Office of the Division of Industrial Hygiene, Department of Labor, passes on all plans for the removal of air contaminants.

Such aspects as rate of ventilation, distribution of baffles, exhaust fan and piping, point of discharge, and fresh air inlet are important considerations. For degreasing tanks, the slot-type lateral exhaust hoods are used along one or both long sides of the tank at the upper edge. For spray booths, down-draft exhaust ventilation through a grid type floor is recommended where large objects are being sprayed. For cleaning degreaser or solvent tanks, particularly where it is necessary for the worker to enter the tank, special safety equipment is essential. Since there is the twofold danger of a high solvent vapor concentration and inadequate oxygen in the bottom of the tank, supplied-air respirators and a life-line are important safety measures. Most important of all is complete airation of the tank before entrance.

In addition to the installation of adequate ventilating systems to minimize both fire and health hazards, certain other safety measures are important. Wherever flammable solvents are in use, the following precautions are essential:

1. All flames, smoking, and so on, must be eliminated.

2. All sources of sparks must be removed. Rubber-soled shoes should be used, and fan blades and tools should be of non-ferrous materials.

3. In spray booths, the booth, floor, baffiles and all other parts of the system must be constructed of fire-resistive materials.

4. Surfaces of walls, and so on, should be smooth to facilitate routine cleaning.

5. All electric lights must be of the vaporproof type, and no switches, motor starters, or other sparking devices should be located within 10 inches of the openings in spray booths. Electric wiring should be enclosed and otherwise follow the requirements of the National Electric Safety Code.

6. All equipment for handling flammable solvents, including funnels and portable containers when the latter are being filled or emptied, should be electrically grounded.

7. Main supplies of solvents should be stored in a fireproof storage building, and all mixing should be done in this building.

8. Fire extinguishers, of types approved by the Underwriters' Laboratories or Factory Mutual Laboratories for the class of hazard concerned, should be provided as protection against incipient fires. Built-in fire extinguishing equipment may be needed to safeguard specific hazards of some size, such as degreasing tanks, as well as to afford general building protection.

Any exposed portion of the worker's body which might come in contact with solvents should be protected by properly compounded creams. Protective clothing is also recommended. Personal cleanliness is important, and good washing accommodations, with cleansing agents that are effective but not harsh, are helpful in reducing skin difficulties.

Medical Control

With regard to the health hazards of solvents, medical control is as important as engineering control.

GOLDITE
TRADE MARK

GOLD PLATING SOLUTION

Introducing **two gold salts for plating solutions**

- **Potassium Gold Cyanide**
- **Sodium Gold Cyanide**

These salts are put up in troy ounces of fine gold content (sizes 1/4, 1/2 and 1 ounces). Consider the advantages of using GOLDITE salts for gold plating solutions.

- ★ Guaranteed fine gold content in troy ounces on bottle.
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For a good white finish use PALLITE palladium plating solution.

Palladium is a sister metal of platinum, highly resistant to corrosion, and similar in appearance. The deposit is brilliantly white and it needs no polishing after plating. It gives perfect protection to silver against tarnishing and corrosion.

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Division of George C. Lambros

Research and Development in Precious Metals

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This is because individual susceptibility varies widely, and also because the early recognition of symptoms is of major importance in avoiding permanent injury.

It is urgent that especially susceptible individuals be weeded out before employment, for a plant with excellent engineering control, where large numbers of workers are safely employed for long periods, may suddenly be confronted with the evil consequences of the serious illness or death of a newly hired, highly susceptible worker. "Workers exposed to toxic substances . . . should be subject to more rigid requirements than other workers. Efforts should be made to eliminate habitual users of alcohol, mouth breathers, those with marked dental defects, and particularly persons showing any indication of anemia, liver or kidney disease, or chronic respiratory diseases," according to the U. S. Public Health Service. It is also possible, by means of skin-patch tests, to discover individuals with allergic skin reactions.

In addition to pre-employment examination, periodic medical checkups are essential. Because of the importance of early recognition of symptoms, a nurse or hygienist trained in this field is a valuable asset in the plant first-aid clinic. Cases have been recorded where the worker, complaining of nausea and gastric upset, was given bicarbonate by a foreman or clinic nurse, and returned to his job, only to become seriously ill. The nurse who recognizes these symptoms in terms of the type of work the employee is doing can save lives. It is not always possible, however, to distinguish between discomfort due to the solvent or to indigestion. Hence, air sampling as well as medical examination of the employee

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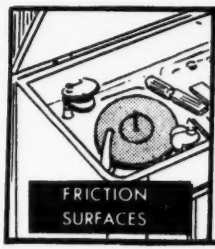

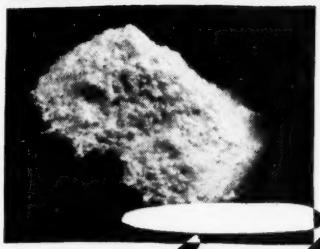

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is recommended as very essential.

Education

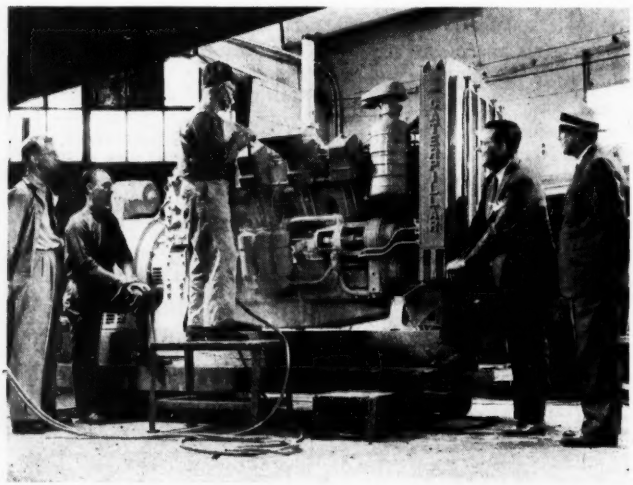
After both engineering and medical controls have been set up, a final important phase of industrial safety must be considered; namely, the education of both management and worker in the dangers involved and the importance of the controls instituted. For management, this is important primarily to guarantee maintenance and supervision of these controls. For the worker, such education is vital, for without employee cooperation, the controls lose much of their effectiveness.

The worker must be trained in the use of fire-fighting equipment, in the importance of good housekeeping, in the recognition of early toxic symptoms, and in the detection of unsuspected or sudden leaks (in most cases there will be a warning odor long before dangerous concentrations of vapor are reached). In general, the worker must have sufficient understanding of the safety factors, and sufficient interest in the safety program, to cooperate actively in the maintenance of the safety controls. Such cooperation can be the most valuable of all safety measures.

Many industrial hygiene authorities believe that, to obtain such cooperation, workers' groups should be given an active part in the formulation and enforcement of the safety program. "The health and safety education program should be carried out by the workers under medical supervision," says the U. S. Public Health Service.

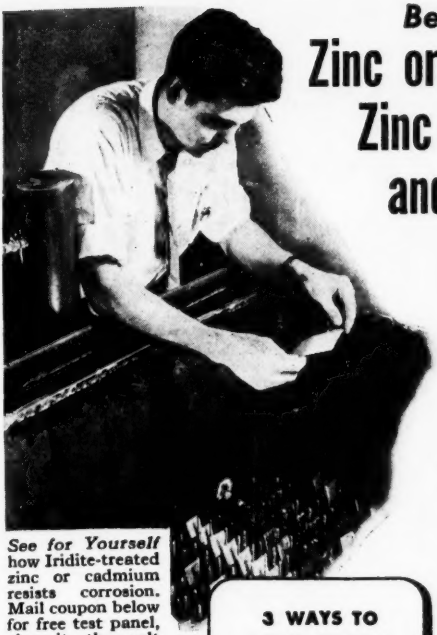
With the proper use of engineering and medical controls, and employee cooperation, the finishing industry can be assured of safety in the handling of all solvents.

Udylite Ball Anode, product of The Udylite Corp., 1651 E. Grand Blvd., Detroit, Mich., is illustrated and described in a bulletin now available free from this firm.



ON hand to watch a spray painter apply a bright coat of famous "Highway Yellow" to a "Caterpillar" Diesel electric set are (left to right) A. O. Walker, general foreman of the paint shop; Don Henson, general foreman, industrial engine assembly; Henry H. Howard, general sales manager; and William Naumann, factory manager.

For the past few years, all Caterpillar products have been painted a lusterless olive drab color because of a scarcity in chrome, one of the main ingredients in the Highway Yellow developed exclusively for Caterpillar.



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The Iridite process meets Army-Navy Aeronautical Specification AN-P-32, Army Ordnance Specification 57-O-2C for Type 1 finish, Navy Ordnance Specification OS-1374, and the equally exacting specifications of such leading manufacturers as Bulova, Sparton, York, Anaconda and many others.

Test Iridite Yourself

Send for free test panel, half of it protected by Iridite, and prove for yourself how Iridite balks corrosion . . . how the Iridite treatment does not alter dimensions of finely machined parts . . . how Iridited parts may be cold worked without flaking, chipping, peeling. Write today for your test panel.

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1 ***As a final finish,*** Iridite is available in a variety of attractive colors.

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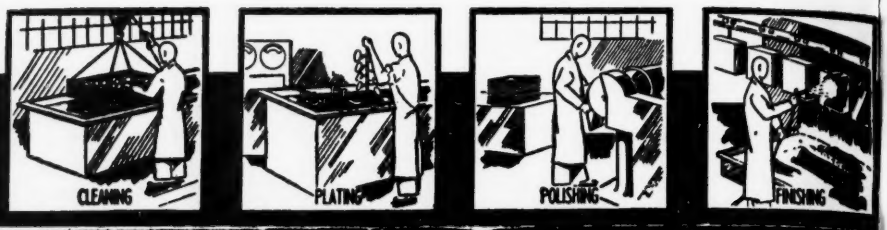


News of the Industry

Arco to Construct New Research Laboratory

Plans for the immediate construction of a new two-story research laboratory for the development of improved paints, lacquers, varnishes, and new industrial coatings have been announced by Howard E. Wise, president of The Arco Company, Cleveland, paint manufacturer. The laboratory, which is scheduled for completion early in 1946, will be of structural steel and brick construction and will be located adjacent to the company's general offices at 7301 Bessemer Ave., Cleveland.

The upper floor will be given over entirely to product development work, and the ground floor to an evaluation and testing laboratory, resin research, and a pilot plant for experimental production of new synthetic resins. Complete facilities for the accelerated testing of new and experimental finishes will be provided in controlled temperature rooms.

Transfer of research activities to the new building will provide an opportunity for increased service to customers in the existing laboratory, which will be devoted solely to production control and service.

Loengard Heads United Chromium

Announcement is made of the appointment of Richard O. Loengard as president of United Chromium, Inc., and Theodore G. Coyle and Hugh D. McLeese as vice presidents. All three men, well known in the electroplating and metal-finishing field, have been associated with the company since its

Architectural Drawing of Arco New Research Laboratory

inception. Messrs. Coyle and McLeese will continue as technical director and general sales manager respectively. Kevie W. Schwartz, who has resigned as vice president, will continue to make

Richard O. Loengard

his services available to the company as a consultant on patent matters.

The opening of district offices by United Chromium in Chicago and Dayton has recently been announced and plans are being made for a new office on the Pacific Coast. In addition to the laboratories and offices maintained at Detroit, Michigan, and Waterbury, Connecticut, a new plant is now being equipped at Carteret, New Jersey, for the manufacture and development of the company's products.

Pennsalt Senior Chemical Engineer

John E. Ohlson, Ch. E., formerly with Wyeth, Inc., Philadelphia, Pa., has been appointed senior chemical engineer of the Pennsylvania Salt Manufacturing Company. Mr. Ohlson, a native of Panama Canal Zone, received his master's degree in engineering at the University of Michigan in 1934.

Prior to his association with Wyeth, Inc., where he served as assistant to the manager of plant operations, Mr. Ohlson was connected with Niacet Chemicals Corporation, Niagara Falls, N. Y., as a process engineer. He is identified with the first commercial vinyl acetate plant in the United States.

Westinghouse Lamp Division Appointments

The appointment of three men to key positions in the Westinghouse Lamp Division, Bloomfield, N. J., is announced by Ralph C. Stuart, vice president in charge of the company's Lamp and Lighting Divisions.

Henry B. Ahlers has been named an assistant on Mr. Stuart's staff; Dr. Albert Brann has been named manager of the division's specifications and standards department, and Paul B. Tully has been appointed assistant manager of lamp manufacturing. All three men will make their headquarters in Bloomfield.

Joins Mac Dermid Inc.

Mac Dermid Inc., announces the appointment of Joseph T. Sullivan as technical sales representative for northern Massachusetts, Maine, Vermont, and New Hampshire. Mr. Sullivan is a graduate of Yale Engineering School, where he received his B. S. degree in metallurgy in 1934. In 1935, he joined the New Haven Clock Company as assistant chemist in their laboratory and subsequently was made chief chemist in charge of all metal-finishing departments.

Mr. Sullivan is a member and past president of the New Haven Branch

Joseph T. Sullivan

of the American Electroplaters' Society and is also a member of the Metal Society.

Dorfan Appointed Manager

Morton I. Dorfan has been appointed manager of the dust and fume engineering division of the American Foundry Equipment Co., Mishawaka, Ind. In this position, he will supervise and coordinate the company's expanded dust control sales, engineering, and research activities.

After graduation from Columbia University with the degree of mechanical engineer, Mr. Dorfan spent several years abroad in post-graduate study. During World War I, he served as a captain in the Ordnance Department. Since then, he has specialized entirely in dust and fume control engineering. His previous activities in this field have been associated with the Allis-Chalmers Manufacturing Company, Blaw-Knox Company, and Pangborn Corporation. Since 1941, he has been engaged in private consulting engineering.

Morton I. Dorfan

Mr. Dorfan is a registered professional engineer and is a member of the American Society of Mechanical Engineers and The American Society of Heating and Ventilating Engineers.

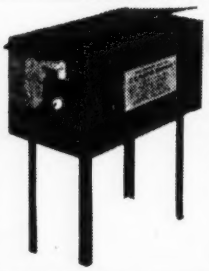
Rheem Appoints Representative

Rheem Research Products, Inc., Baltimore, Md., has appointed J. C. Baker to represent the company and its product, Iridite, in the eastern Ohio-western Pennsylvania-West Virginia territory.

Mr. Baker was formerly associated with the Black Industries, Cleveland, as production controller and director of purchases, and is widely known to industrial executives throughout the territory.

Deburrette De-Burring Process. An illustrated circular descriptive of a process whereby precision machined soft or hard metal parts can be de-burred and finished at a rapid rate is now being distributed by the De-Burr Barrel Co., Inc., 4577 Hollywood Blvd., Los Angeles 27, Calif. Copy free upon request.

U. S. A. Brand Felt Wheels, Sheets, and Bobs are the subject of a 20-page booklet now being distributed by the Eastern Felt Co., 80 Canal St., Winchester, Mass. Methods followed in manufacturing these felt products are discussed and tables are included listing the approximate weights of platers' wheels and sheet felts. Copy free upon request.



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Cooper specially engineered electric or gas heated thermostat controlled tanks pay for themselves in a hurry. A multitude of uses. 5, 15, 30, 60 gallon sizes and larger. Quick delivery. Write for circular.

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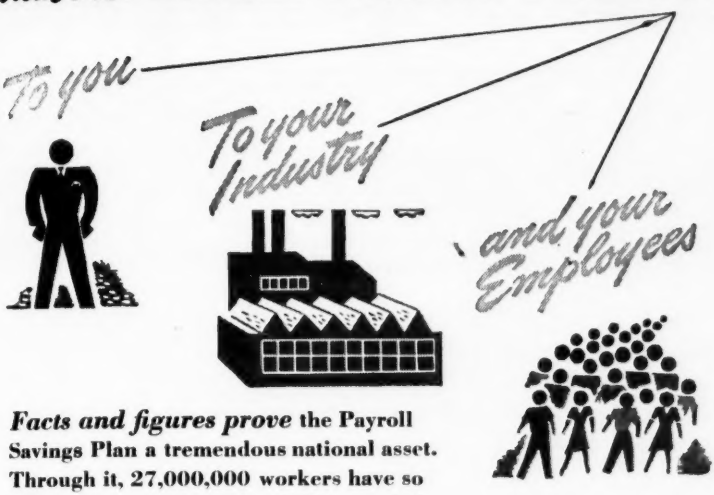
D. C. COOPER COMPANY, 20 East 18th Street, Chicago 16, Illinois

what the PAYROLL SAVINGS PLAN *means*



Facts and figures prove **the Payroll Savings Plan a tremendous national asset. Through it, 27,000,000 workers have so far saved more than $13½ billions to help speed victory . . . forestall inflation . . . and build peacetime prosperity!**

Yours is one of 240,000 companies maintaining a Payroll Savings Plan. While fostering national security, this combined effort is creating a lucrative postwar market for you . . . and all industry!

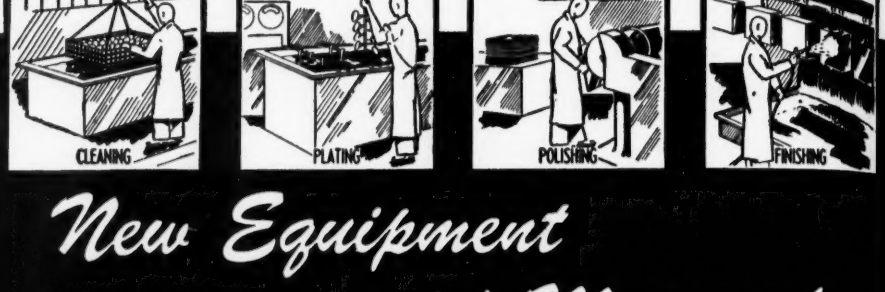
Enrollees in this plan total 76% of all industrial employees . . . averaging a $25 bond each month per individual. Through this, millions now look forward to homes, educational opportunities and old age independence.

Surely, so great an asset is worthy of your continued . . . and increased . . . support! Now is the time to take stock of your Payroll Savings Plan. Use selective resolicitation to keep it at its 7th War Loan high . . . and build it even higher!

The Treasury Department acknowledges with appreciation the publication of this message by

PRODUCTS FINISHING

This is an official U.S. Treasury advertisement prepared under the auspices of the Treasury Department and War Advertising Council

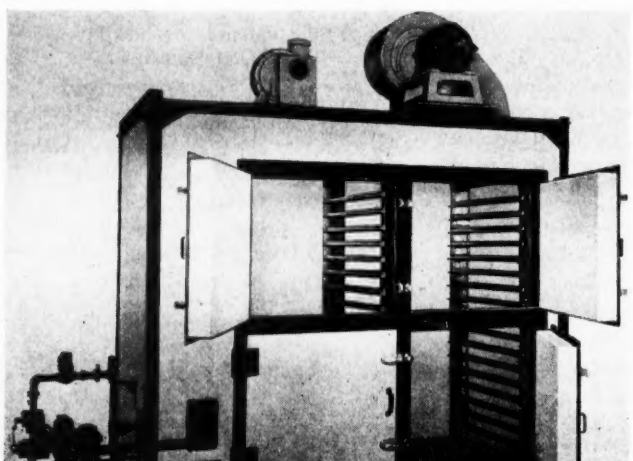


New Equipment and Materials

Gehnrich Recirculating Cabinet Oven

To meet requirements for baking or drying operations where quick removal of volatiles produced by heating the work and reduction of heat processing time by means of frequent air changes are required, a shelf-loading oven with a self-contained heating system has been developed by the Gehnrich Oven Division of W. S. Rockwell Co., 50 Church St., New York 7, N. Y. This type of oven (or dryer) is said to combine the advantages of an internal heating system with air recirculation in a heat processing chamber that can be made of any desired size with any number of shelves or trays.

The oven is of insulated steel panel construction throughout, with the thickness of insulation used depending on the temperature of the process. Firing into a combustion chamber at the left of the processing oven is a line type gas burner connected to a motor-mix proportioning unit, complete with motor and air safety control valves, flame-otrol, electrode and spark plug for automatic relighting of the burner. The combustion and heating chambers are separated by a slotted shield.



Gehnrich Recirculating Cabinet Oven

Heat generated by the burner is drawn upward by means of a large recirculating fan mounted on the oven roof which forces the heated air through a duct into a distributor duct at the right-hand side of the oven, where the air is forced through adjustable slide louvres in streams across the full width of the oven, moving uniformly above and below each shelf or tray of work. It is then drawn through similar slots into the combustion chamber for recirculation. Mounted also on the roof is a motor-driven exhaust fan to draw off volatiles emanating from the work as it is heated.

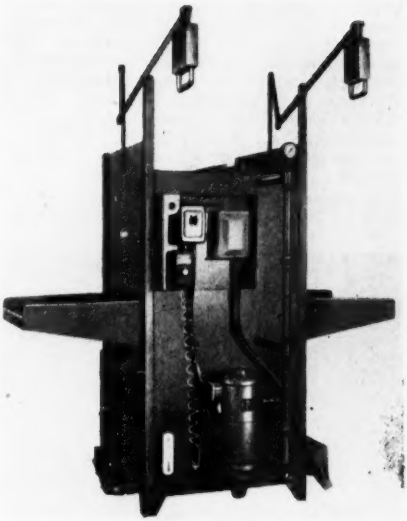
Thus, with racks placed on any desired centers for the trays of work, with a uniform stream of heated air passing continuously over the material at whatever speed may prove most suitable to provide the required frequency of air changes, and with provision for exhausting any dangerous or undesirable fumes or vapors, the oven offers complete baking or drying uniformity at an unusually fast rate. Moreover, recirculation of heat through the combustion chamber effects definite fuel economy, due to the use of high temperature air for combustion.

The oven is made with four doors for easy access to any one section of the unit without unnecessary exposure of the remaining load. Each door is provided with an explosion relief latch so as to open on development of pressure in the oven beyond that required for safe operation. In addition, by interlocking in a fully automatic hook-up all controls for temperature, gas supply, ignition, air flow and motor operation, complete protection is provided for the heating process, product, oven, and operators. If electric heating is preferred, electric ribbon heaters can easily be mounted in the combustion space, with connections to required switches and controls.

Thus, the oven is said to offer absolutely safe, uniform baking, drying, or curing of bulk materials, chemicals or plastics, or objects that may be coated or impregnated with chemicals or heat treating of metals from 100 to 1,000 deg. Fahrenheit.

Optimus Single Stage Washer

Designed to permit rinsing and washing in one unit, the Optimus Single Stage Washer illustrated herewith has been brought out by the Optimus Equipment Co., 133 Church St., Matawan, N. J. Readily portable, the washer can be easily located wherever the work is, thus eliminating the need of bringing the work to the machine. In addition, the machine can be readily moved from one location to another as the flow of work eases or shifts from department to department.



Optimus Single Stage Washer

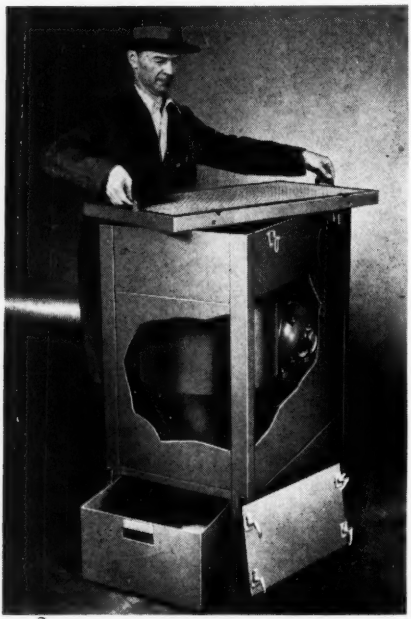
Compact, quick-working, and convenient to use, the Optimus Single Stage Washer occupies a floor area of 12 square feet and is supplied complete with moving jets and easy-operating vertical sliding doors that are said to adequately control splash and spray. The unit can be equipped with any type heating device and thermostatic control.

Model 1150 "Dustkop" Dust Collector

With an extra thick, flat filter instead of the familiar round type, the Model 1150 "Dustkop" Dust Collector illustrated herewith has been added to the line of individual self-contained dust collecting units offered by the Aget-

Detroit Co., 604 First National Bldg., Ann Arbor, Mich. Although designed for individual use in connection with large wheel dry grinders, disc grinders, sanders, and so on, as well as polishing and buffing equipment, the Model 1150 is said to be equally adaptable to more than two wheels when the wheels are small and are grouped close together.

Being of the unit type, the Model 1150 Dustkop is claimed to require no



Model 1150 "Dustkop" Dust Collector

ductwork for installation, thus enabling it to be placed in operation within a very short time. Due to its compactness, the collector, which occupies a floor space of 20x36 inches, can usually be located behind the grinder or buffer without moving the latter. The connection between dust outlets and the collector can be effected quickly with flexible metal hose or standard sheet metal pipe. The installation is completed by electrically connecting the unit into the starter circuit of the grinder.

Dust, dirt, and lint created at the point of operation is drawn into the collector by means of a non-clogging paddle wheel fan which is direct driven by a continuous duty 1½ h. p. 3,450 r.p.m. motor. A cyclone separator contained within the unit separates most of the dust and dirt out of the air stream, with the extremely fine dust particles being removed by the spun glass filter before the air is returned to the working area. A hand crank located on one end of the cabinet is used for shaking the fine dust from the filter so that the dust can be brushed down the stack hole and into a collecting bin. The latter, occupying the entire bottom of the cabinet, is provided with a drawer to permit easy removal and disposal of the collected dust, dirt, lint, bristles, and so on. Renewal of the spun glass filter material, which is said to be required only at infrequent intervals, can be quickly and economically effected.

The Model 1150 Dustkop Dust Collector is available with motors for operation on virtually any type of power and can be supplied with inlet sleeves for various size connections to one or more dust sources.

Gerlach "60 Degreaser"

A non-phenolic type cleaner and degreaser which, while fast and efficient, is said to be harmless to all metals, painted surfaces, hands, and fabrics, to be known as Gerlach "60 Degreaser," is now being manufactured by the E. A. Gerlach Co., 23rd and Ontario Sts., Philadelphia 40, Pa. Supplied in concentrated form in 10-gallon cans and 55-gallon drums, the material, for degreasing metal parts, is mixed in a ratio of 1 gallon of degreaser to 5 gallons of kerosene or light fuel oil distillate, thus providing 6 gallons of degreasing solution which can be applied by spray or brush.

For cleaning painted surfaces, approximately 1 cup of Gerlach 60 Degreaser is added to 3 gallons of water, thus providing a highly efficient cleaning solution for removing road film, grease, oil, clay, and other dirt from painted surfaces without streaking. The material is also said to be adaptable to all types of cold tank cleaning. A solution of 5 parts kerosene or light fuel oil distillate to 1 part 60 Degreaser is said to afford an effective means for the tank cleaning of small parts.

Hammond
OF KALAMAZOO

VARIABLE SPEED POLISHING and BUFFING LATHES

Finer, Better, More Uniform finishes and increased production result from use of Hammond Variable Speed Lathes — 1500 to 3000 RPM instantly obtainable — the Dial Does It! Write for bulletin.

1500 to 3000 RPM
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Hammond Machinery Builders INC

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Take the

out of your FILTERING
with the
"Horizontal Plate"

You will be surprised how uniformly clean and clear your plating solutions can be kept, as the Sparkler process removes every bit of abrasive material and dirt stirred up from the bottom of plating tanks.

Rough finishes, buffing, pittings and pin holes are eliminated. Sparkler Filters are comprised of perforated plates spun from one piece of metal. No messy screens to clog up, clean or replace. Filtering is fast dependable, finest quality. Adapted for any plain filter aid or activated carbon.

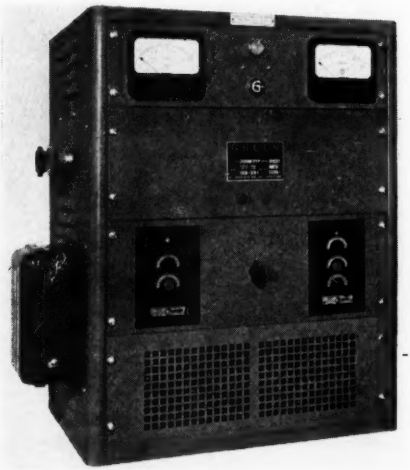
Write to have our district engineer call, or for any special information.

SPARKLER HORIZONTAL PLATE FILTERS

SPARKLER MANUFACTURING CO.
255 LAKE STREET MUNDELEIN, ILLINOIS

Green Stabilized Low Voltage Rectifier

A stabilized rectifier with low voltage high current output is announced by the Green Electric Co., 130 Cedar St., New York, N. Y. The unit illustrated is rated at 200 amperes, with voltage



Green Stabilized Low Voltage Rectifier

range of from zero to 3 volts. Any voltage selected within the range is said to be maintained to within 50 millivolts over load variation from zero to 200 amperes and with line voltage variation of plus or minus ten per cent.

The voltage stabilizer system includes a motor-driven Powerstat and a simple electronic pilot device. The principle of electronic stabilization is readily applicable to rectifier units of larger or smaller size than that shown.

Everclear "Everstick" Plastic Plate

The Pennsylvania Plastics Corp., 5025 Liberty Ave., Pittsburgh, Pa., has developed a gummed plastic plate which is said to adhere and permanently bond to any clean surface when moistened with solvents such as benzene, naphtha, and so on.

According to the manufacturer, the plate, which is known as the Everclear "Everstick," will adhere to any shaped surface, with adhesion being unaffected by weather conditions, and is unusually durable. Offered in an unlimited range of permanent type colors, the plate is available with fluorescent and phosphorescent letters.

Optimus Aluminum Pre-Cleaner and Deoxidizers

The Optimus Detergents Co., 132 Church St., Matawan, N. J., announces the introduction of an aluminum pre-cleaner and deoxidizers, use of which permits the producing of low surface resistance on aluminum preparatory to spot welding.

Designed to completely remove dirt, cutting oil, grease, and identification paint, the pre-cleaner and deoxidizers are also said to put aluminum in condition for Alrok treatment, anodizing, and painting. With the use of the proper method, all classes of alloys can be easily handled.

Those Perfect Partners For Pickling

NEP and SUMFOAM

• TO SAVE ACID IN PICKLING •

• TO PREVENT FUMES •

THE WM. M. PARKIN CO. • 1102 HIGHLAND BLDG.

PITTSBURGH 6, PA.

BUCKINGHAM GREASELESS

We have served you well with this and many other of our products in war time and will be on hand to serve you in your postwar work.

There will be greater need in postwar work for this particular type of composition than ever before and we will welcome your request for assistance in determining the grade most suited to your job and will gladly oblige with samples, information, and wherever necessary a representative to help work out your problems.

Samples on request—Manufacturers of a complete line of Buffing Compositions.

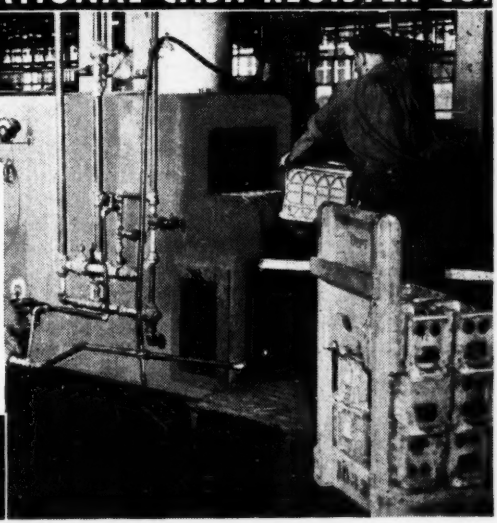
THE BUCKINGHAM PRODUCTS CO.

8900 HUBBELL AVENUE

DETROIT 27 MICHIGAN

HOWARD Cleaning Machine

Washing Intricate Parts for NATIONAL CASH REGISTER CO.



This HOWARD wash and dry machine cleans an average of 2,750 aluminum castings a day in National Cash Register's Foundry Department. Provides top production with negligible downtime and maintenance costs. Consult Howard Engineers for better results on your mass production cleaning. Write for catalog.

Machinery for Pickling • Tumbling Deburring • Washing • Quenching Drying • Burnishing

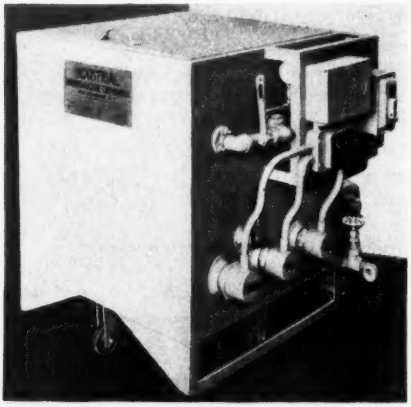
HOWARD ENGINEERING and MANUFACTURING Co.

2237 BUCK STREET

CINCINNATI 14, OHIO

Industrial Model C. B. H. Portable Washing Machine

Designated as the Model C. B. H., a portable washing machine for the



Industrial Model C.B.H. Portable Washing Machine

cleaning of stampings, ball bearings, castings, and so on, is now being manufactured by the Industrial Washing Machine Corp., New Brunswick, N. J. Compact (3 feet x 3 feet 6 inches overall), and light in weight (300 lb.), the machine is said to enable parts to be cleaned in less than one minute and is designed to prevent detergents from coming in contact with the operator's hands so as to eliminate dermatitis.

The Model C. B. H. consists of a tank and housing on which are mounted electric immersion heaters, a pump and motors, valves, completely wired switches, gages, and so on. Parts to be cleaned are placed in a square mesh basket measuring 16x16 inches; the cover is lowered, and the spray valve turned. The force of the spray causes the basket to rotate so that all of the material is completely cleaned.

If desired, the basket can be removed and the machine used as a dip tank for the wax or oil dipping of parts.

Peninsular Insulating Products

Peninsular Chemical Products Co., 6795 E. Nine Mile Rd., Van Dyke, Mich., announces two insulating products for plating plant use— Pen-Tape, an elastic flexible masking tape for the insulation of plating racks and masking of parts for selective plating; and Pen-Tube for the quick insulation of plating rack contact wires. These materials are said to effectively resist all plating and cleaning solutions and to withstand rough handling and abrasion. According to the manufacturer, they will not harden or crack under the severest service but remain tough and flexible throughout long continued use.

Pen-Tape can be very easily applied since it is designed to conform readily to irregular contours and can be wrapped snugly around shoulders, and so on. It can be pulled out to more than twice its original length, thus affording unusual economy from the standpoint of coverage, and its elasticity and frictional properties provide for the holding of the tape firmly in place.

Since it is made by a precision calendering process, Pen-Tape is claimed to be uniformly thick and perfectly smooth throughout, thereby assuring flat, leakproof overlaps and minimum dragout of solutions. It cannot stain or adhere to the work, is readily removed

SOL-KLEAN
for
Better Paint Adhesion
INDUSTRIAL CHEMICAL PRODUCTS CO.
DETROIT 7
Milwaukee Fort Wayne

BETTER PLATING, LESS COST!
"MGC" ELECTROPLATING EQUIPMENT
Write for Interesting Details TODAY!
MOTOR GENERATOR CORP., HOBART SQ. PF-95 TROY, OHIO

INDIAN BRAND

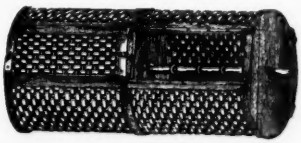
Polishing Abrasive
Long Wearing

Indian Brand polishing abrasive has been perfected by our engineers as a substitute for imported Turkish Emery.
This new, long wearing, economical abrasive grain, now being used in many leading defense plants, has brought outstanding results to its users.

Send for trial lot—Free.

HAMILTON
Emery & Corundum Co.
CHESTER MASS.

Inexpensive, light in weight.
Easy to install and operate.



King White-Oak Plating Barrel

becomes a sub-anode, thereby producing a cleaner, brighter plate. Less plating time is required to put on the desired thickness of plate.

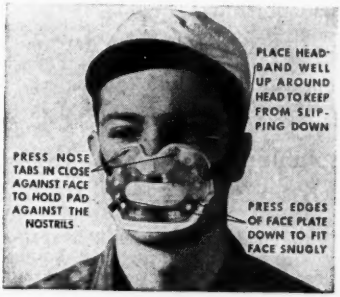
Send for catalogue and specification sheets.

JOHN KING 48 SPRINGFIELD ST. DAYTON 3, OHIO

SEND $1.00 FOR ONE MARTINDALE PROTECTIVE MASK and 50 No. 1 Refills

or $1.25 if you prefer No. 2 Refills

Weigh Less Than ½ oz.


PLACE HEAD-BAND WELL UP AROUND HEAD TO KEEP FROM SLIP-PING DOWN
PRESS NOSE TABS IN CLOSE AGAINST FACE TO HOLD PAD AGAINST THE NOSTRILS
PRESS EDGES OF FACE PLATE DOWN TO FIT FACE SNUGLY

Not Recommended for Toxic Dusts or Free Silica

LIST PRICES—F.O.B. CLEVELAND, OHIO

Masks	$0.25 each
No. 1 Refills (std. weight)	.01½ each
No. 2 Refills (heavyweight)	.02 each

Masks packed in individual envelopes.

Refills packed in envelopes of 25.

The No. 2 Refills contain twice as much filtering cotton as the No. 1.

Write for Bulletin 348 showing quantity discounts on orders of $5.00 and over

If payment accompanies order we will pay parcel post or express charges. Minimum order for C.O.D. or charge account $2.00

Martindale Electric Co.
1367 HIRD AVE. CLEVELAND 7, OHIO

after plating, and the same piece can be used again and again, the manufacturer states. Regularly furnished in ¾-inch widths for general purpose use, Pen-Tape can also be supplied in any special width desired.

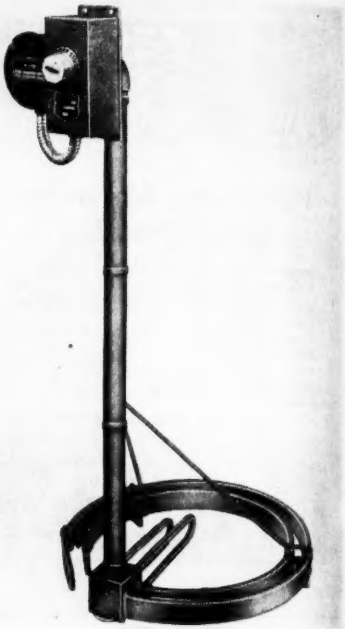
Pen-Tube is made of the same material as Pen-Tape but it is tubular in form and can be readily slipped into place. It is regularly available in sizes from $\frac{1}{16}$ to 1 inch inside diameter. Other sizes can be furnished on application, and all sizes are said to be of the correct wall thickness.

For rush jobs on plating racks, Pen-Tape and Pen-Tube can be quickly applied and the racks used immediately. For permanent insulation of racks for production plating, these materials can be fused into smooth integral coverings by heating to 260 deg. F. for 20 minutes. Repairs made to the coverings become integral parts of same.

Chromalox Type BLC Portable Drum Immersion Heater

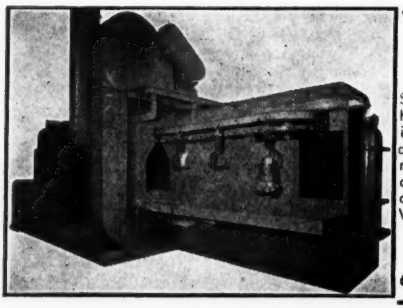
Designated as the Chromalox Type BLC, an electric immersion heater specially designed for melting solid oil, greases, and like compounds in standard 55-gallon drums and similar containers by allowing the unit to melt its way down through the contents is announced by the Edwin L. Wiegand Co., 7504 Thomas Blvd., Pittsburgh 8, Pennsylvania.

The unit includes steel sheathed heating elements which form almost a complete circle around a tubular unit located in the center—a construction which is said to provide for the elimination of cold areas which would leave unmelted masses of material or which might cause the heater to tip over. Rigid design is obtained through the use of steel braces welded to the steel riser through which the electrical connections are brought out to a standard conduit box. The heater can be controlled by means of a three-heat switch or themostat mounted directly on the terminal box.



Chromalox Type BLC Portable Drum Immersion Heater

The Chromalox Type BLC Portable Drum Immersion Heater is available in ratings up to 4,400 watts for operation on 115 or 230 volts, single phase current.



HYDRO-FLOW

INDUSTRIAL WASHING MACHINES

Streamlined design. Recirculating hot or cold air blow off. Hidden motors, pumps and pipes are easily accessible. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Handling alkali to varsol as cleaner. Monorail, Belt, or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

INTERNATIONAL CONVEYOR & WASHER CORP.

Write for circular.

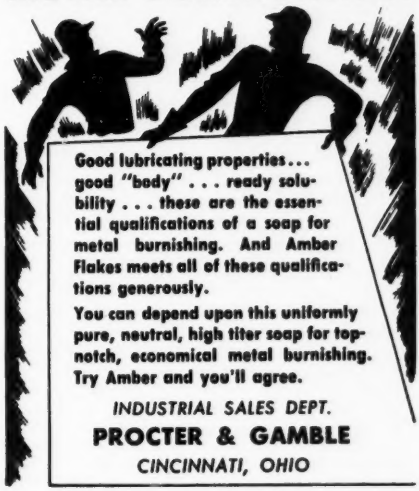
652 E. FORT ST. DETROIT 26, MICH.

For Deburring, Cutting Down and high polishing of all types of metal parts use a Lupomatic

Our DEBURRMASTER installed in your plant will save you time and money and really get you to produce a better product.

LUPOMATIC TUMBLING MACHINE CO., INC.
4510 BULLARD AVE. BRONX, N. Y.

AMBER FLAKES
for efficient, economical
METAL BURNISHING!



Good lubricating properties... good "body" . . . ready solubility . . . these are the essential qualifications of a soap for metal burnishing. And Amber Flakes meets all of these qualifications generously.

You can depend upon this uniformly pure, neutral, high titer soap for top-notch, economical metal burnishing. Try Amber and you'll agree.

INDUSTRIAL SALES DEPT.
PROCTER & GAMBLE
CINCINNATI, OHIO

"ROBINSON'S ASSAYED"

Gold Plating Solutions

Are Nationally Endorsed

MADE BY A. Robinson & Son
131 CANAL ST. NEW YORK

Silastic

The Dow Corning Corp., P. O. Box 592, Midland, Mich., announces the availability of Silastic, a silicone rubber, produced in various stocks for molding, extruding, coating, and laminating. Largely because of their inorganic origins, these rubbery organosilicon oxide polymers are said to remain elastic after heating at temperatures up to 500 deg. F. and retain flexibility at temperatures as low as minus 70 deg. Fahrenheit.

Silastic coated lead wire and other continuous extruded shapes are made from Silastic stocks designed for extruding. Also available are Silastic stocks compounded for coating glass or asbestos cloth to produce flexible, waterproof, heat-stable, oil-resistant gaskets, diaphragms, tape, and electrical insulation which is claimed to be non-tracking, arc and oxidation resistant.

Silastic is also used to insulate wire wound resistors with waterproof, heat-resistant, elastic coatings able to withstand the severe and repeated thermal shocks specified for Grade I Class I resistors. Silastic coatings are said to adhere to glass, vitreous enamel, iron, steel, and aluminum, and constitute protective coatings resistant to oil and salt brines at elevated temperatures.

ALLWOOD

"Vienna Brand" Lime

Made from Limestone that is identical in chemical analysis and geological structure with European Imported Lime. Tests show a "lime cake" made from Allwood "Vienna Brand" Lime equals the finish made from imported lime.

WRITE FOR FULL PARTICULARS

ALLWOOD LIME COMPANY

Manitowoc • Wisconsin

INVESTIGATE . . .

"BLAXITE"

RAPID BLACK OXIDE FINISHES

for

STEEL — ZINC — BRASS

THE TOBLER CHEMICAL CO.

28 OLIVER ST., BOSTON

Phillips Plastic Dip Tank

The Phillips Manufacturing Co., 3412 W. Touhy Ave., Chicago 45, Ill., is now offering an improved melting tank for

Phillips Plastic Dip Tank

ethyl cellulose dip compounds which is said to maintain critical melt with a temperature variation of less than 3 deg. F. The unit has a capacity for 15 gallons of melted ethyl cellulose or similar compounds.

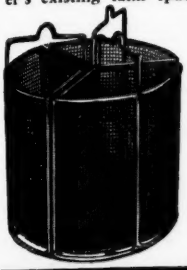
The melting tank is encased in an oil bath by means of which heat is transmitted throughout the melt uniformly by convection. Thermostatic controls are provided to keep the melt at exactly the temperautre desired, and a separate screened-off section is included in the design for use in adding unmelted ethyl cellulose so that it does not enter the melt until of the proper consistency.

The Phillips Plastic Dip Tank is of all-steel arc-welded construction and is insulated throughout, with controls completely enclosed and protected.

ROLOCK

PROCESSING CARRIERS

This 3 in 1 basket was designed by Rolock to handle 3 different metal parts in the customer's existing tank space . . . to lower costs, speed and improve work.



Send us your problems for metal parts handling during finishing processes. Nothing better than Rolock custom-built baskets, trays, racks, crates and fixtures . . . to 8,000 lbs. capacity.

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Now for EVERY WORK SHOP!

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Easy to Plate CHROMIUM

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If you have a workshop—at home or in business—you need this new Warner Electroplater. At the stroke of an electrified brush, you can electroplate models and projects—you can replate worn articles, faucets, tools, fixtures, silverware, etc. with a durable, sparkling coat of metal . . . Gold, Silver, Chromium, Nickel, Copper or Cadmium. Method is easy, simple, quick. Everything furnished—equipment complete, ready for use. *By doing a bit of work for others, your machine can pay for itself within a week.* So make your shop complete by getting a Warner Electroplater right away. Send today for FREE SAMPLE and illustrated literature. ACT AT ONCE!

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- MODEL MAKERS
- MAINTENANCE
- HOBBY SHOPS
- HOME SHOPS
- SALVAGE PARTS

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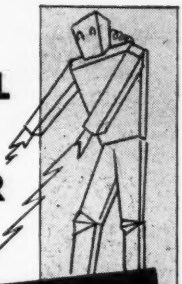
463 N. Wells St., Chicago 10, Ill.

PUT THIS INDUSTRIAL GIANT TO WORK FOR *you!*



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GAS OR ELECTRIC UNITS

- DRYING
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- BAKING
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Amazing economies are typical of CARBOMATIC Infra-Red installations now in use in many textile plants. We suggest that you investigate the possibilities of this modern industrial giant.

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INFRA-RED C DIVISION

CARBOMATIC CORPORATION

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Also—H. W. Butterworth & Sons Co., Philadelphia, Pa.
In Canada—Canadian Textile Engrg. Ltd.
980 St. Antoine Street, Montreal, P. Q.

The Finishing Touch — **By J. A. Patterson**

"Do you mean you called us all the way up here just because this dope had a box of matches catch fire in his pocket?"

Melamine. An unusually attractive 24-page booklet illustrating and describing the many applications of the chemical melamine in the plastics, textile, leather, chemical, paint, and allied industries has been published by the American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y. Among the more important applications of melamine are its use in plastics of high arc resistance and in improved enamels suited to the mass production of automobiles and household appliances. Copy of the booklet is available to mechanical executives free upon request.

Polishing Room Accessories. Time-saving accessories that are designed to speed production and promote safety in performing polishing, buffing, and deburring operations are illustrated and described in Bulletin 102 published by The Manderscheid Co., 605 W. Washington St., Chicago 6, Ill. Items covered include a semi-automatic tube polishing machine, balancing ways and mandrels, polishing lathe chucks and tapered screw points, polishing lathe collars, wrenches, flanges and nuts, polishing wheel balancing weights, bushings and reducer bushings, buffing wheel rakes, emery troughs and covers. Copy of Bulletin 102 free upon request.

"3-M Adhesives in Industry," a 12-page booklet which should be interesting and helpful to users of adhesives, sealers, coatings or insulating compounds, impregnators and sound-deadeners, has been prepared by the Minnesota Mining and Manufacturing Company. The booklet illustrates and describes adhesive operations in many different industries, methods of adhesive application, and includes a list of the physical properties of adhesives. It also lists various formulas and shows the viscosity, bonding range, color, weight, characteristics, and uses of and Government specifications for various adhesives. In addition, the booklet contains an adhesive project sheet for the analysis of adhesive problems.

Copy of the booklet is available free by writing to the Advertising Department, Minnesota Mining and Manufacturing Co., St. Paul, Minnesota.

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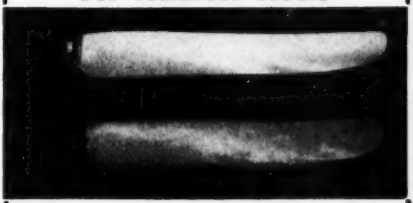
For Stainless Steels



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Produce that extra value in a beautiful finish — are known for economical cutting, cut and color and mirror finishing on all kinds of steel including stainless and carbon steels and hard-to-buff alloys.

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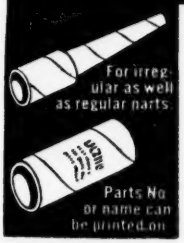
KEEP OUT DUST AND RUST!

OUTSIDE AND INSIDE



Protect parts on storage or transit with tough Precision caps or inserts that *fit*. Safeguard threads and surfaces *at every point!*

PRECISION *Dust Caps* • *Thread Protectors*

Spirally wound, acid-free. Shapes to fit any requirement regular or irregular. Send for samples and *economical* prices.

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2053 W. CHARLESTON ST. **CHICAGO 47, ILLINOIS**

CATALOGS

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Dual Heat Ovens
The advantages of the design of Dual Heat infra-red ovens, coordinated with Jensen Conveyors, are outlined in a 12-page bulletin available from Jensen Specialties, Inc., 9331 Freeland, Detroit 27, Michigan.

2. Cleaning Die Castings
A 12-page digest of cleaning materials and methods for the surface preparation of die castings prior to the application of chemical, organic, or electroplating finishes has been released by Oakite Products, Inc., 20 Thames St., New York 6, New York.

3. Metal Cleaning Equipment
A four-page folder which illustrates and describes a well-rounded line of equipment for cleaning war products such as cartridges, gun barrels, shells and similar products is now being issued by the Alvey-Ferguson Co., 162 Disney St., Cincinnati, Ohio.

4. Vapor Degreasing
A hand book of questions and answers on the subject of vapor degreasing, written especially for engineers and production men, has been published by the Phillips Manufacturing Co., 3494 West Touhy Ave., Chicago 45, Illinois.

5. Fire Extinguisher Maintenance
"Inspection and Maintenance of First Aid Fire Extinguishers" is the title of a helpful, practical manual which is written in non-technical language the plant foreman or fire chief can easily understand. Walter Kidde & Co., 445 Main St., Belleville, New Jersey.

6. Protective Coatings
A bulletin containing full details on masking lacquers for hard chrome, copper, cadmium, tin, zinc, and silver, as well as on rack coatings, has been published by the Peninsular Chemical Products Co., 6795 E. Nine Mile Rd., Van Dyke, Michigan.

7. Dust Control Equipment
The Ducon Co., 259 Norman Avenue, Brooklyn, N. Y., has published an eight-page illustrated catalog covering cyclone and multiple-bag dust collectors, unit filters, and air and gas washers.

8. Conveyors for Infra-Red Layouts
The use of conveying systems in infra-red drying and baking operations is graphically described in Bulletin 150 issued by the Gifford-Wood Co., 429 Lexington Ave., New York, New York.

9. Solvent Degreasing
A 16-page booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants and describes typical kinds of degreasers has been published by the Detrex Corp., 13017 Hillview Ave., Detroit 27, Michigan.

10. Lead Plating
Harshaw Chemical Co., 1945 E. 97th St., Cleveland, Ohio, has available a bul-

letin which describes lead plating with Harshaw fluoborate lead solution concentrate—suggested uses, solution preparation, equipment and procedure.

11. Solvent Vapor Degreasers

A 24-page catalog which describes the many standard and special applications of Blakeslee Degreasers and their economical operation has been prepared by G. S. Blakeslee & Co., Cicero 50, Illinois.

12. Rodine

A standard control for fast, efficient, economical pickling —"Rodine"— is the subject of a descriptive folder now available from the manufacturer, American Chemical Paint Co., Ambler, Pennsylvania.

13. Industrial Ovens

The Kirk & Blum Manufacturing Co., 2816 Spring Grove Ave., Cincinnati, Ohio, has prepared an informative booklet on the various types of industrial ovens designed and installed by this company to meet individual requirements in product finishing.

14. Anodes and Plating Chemicals

Data on nickel, brass, copper, zinc, cadmium, tin, lead and silver anodes, and anodes for chromium plating, are given in Bulletin AC-105, prepared by the Hanson-Van Winkle-Munning Co., Matawan, N. J.

15. Chemifinishes

General information concerning the chemical finishing of metals together with detailed data on Du-Lite Chemifinishes for steel, brass, copper, and zinc is contained in a portfolio prepared by the Du-Lite Chemical Corp., Middletown, Connecticut.

16. Fire Extinguishing Equipment

A line of portable and built-in carbon dioxide fire extinguishing equipment and smoke detecting systems is described in a 12-page two-color illustrated booklet issued by the C-O-Two Fire Equipment Co., Newark 1, New Jersey.

17. Pressure-Sensitive Tapes

A 16-page booklet published by the Industrial Tape Corp., New Brunswick, N. J., illustrates and discusses from the standpoint of production the types of uses for pressure-sensitive tapes in industry.

18. Near Infra-Red Process

A special profusely illustrated brochure on the near infra-red process has been prepared by the Wabash Appliance Corp., 345 Carroll St., Brooklyn 31, New York.

19. Blackening Non-Ferrous Metals

An eight-page booklet describing advantages of Ebonol-Z chemical which passivates zinc surfaces for organic finishing is now being distributed by The Enthone Co., 443 Elm St., New Haven 2, Connecticut.

20. Electric Heating Units

Catalog 42 regarding Chromalox electric heating units, thermostats, and other equipment, as well as engineering data on electric heating, is now available from the Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 9, Pennsylvania.

21. Felt Products

A 20-page illustrated booklet containing complete information on felt wheels, sheets, and bobs for polishing and deburring operations is now being distributed by the Eastern Felt Co., 80 Canal St., Winchester, Massachusetts.

22. Metal Fluoborates

Technical Service Bulletin No. 1015-A now available from the General Chemical Co., 40 Rector St., New York 6, N. Y., contains complete research data on metal fluoborates and their use in connection with electrolytic and metallurgical processes.

Print plainly in filling out coupon for literature.

PRODUCTS FINISHING
431 Main St., Cincinnati 2, Ohio

I am interested in receiving the following literature reviewed in your September issue.

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Index to Advertisements

Allwood Lime Co. 120
Alvey-Ferguson Co. 43
American Chemical Paint Co. 93

Baker & Co., Inc. 28
Ballou Co., Edward C. 121
Blakeslee & Co., G. S. 102
Buckingham Products Co. 115

C-O-Two Fire Equipment Co. 27
Carborundum Co. 21
Carbomatic Corp. 123
Cooper Co., D. C. 108
Cowles Detergent Co. 38
Curran Corporation 31

Despatch Oven Co. 95
Detrex Corporation ..... 47, Fourth Cover
Du-Lite Chemical Corporation 26
Du Pont de Nemours & Co., Inc., E. I., Electrochemicals Div. 23

Eastern Felt Co. 70
Egyptian Lacquer Mfg. Co. 36
Electric Products Co. 30
Enthone Co., The 9

Ferro Enamel Corporation 51
Fidelity Chemical Products Corp. 86
Fostoria Industrial Service 29

General Chemical Co. 49
General Electric Co., Lamp Div. 19
Gifford-Wood Co. 59
Glidden Co. 13

Hall Lamp Co., C. M. 25
Hamilton Emery & Corundum Co. 117
Hammond Machinery Builders, Inc. 113
Hanson-Van Winkle-Munning Co. 3
Harrison & Co., Inc. 125
Harshaw Chemical Co. 18
Horn Co., A. C., Products Finishing Div. 34
Howard Engineering & Mfg. Co. 115

Industrial Chemical Products Co. 116
Industrial Filter & Pump Mfg. Co. 79
Industrial Tape Corporation 6, 7
Industrial Washing Machine Corp. 80
International Conveyor & Washer Corp. 118
International Nickel Co., Inc. 5
International Rustproof Corp. 61

Jensen Specialties, Inc. 62

Keystone Emery Mills 78
Kidde & Co., Inc., Walter 64, 65
King, John 117
Kirk & Blum Mfg. Co. 17

Lea Manufacturing Co. 75
Lupomatic Tumbling Machine Co. 119

MacDermid Incorporated 35
Magnus Chemical Co., Inc. 85
Mahon Co., The R. C. 71
Manderscheid Co. 33
Martindale Electric Co. 117
Michigan Chrome & Chemical Co. 99
Minnesota Mining & Mfg. Co. 57
Motor Generator Corporation, Division of Hobart Bros. 116

Neilson Chemical Co. 16
Norton Co. 2
Nu-White Products Co. 98

Oakite Products, Incorporated 1
Optimus Equipment Co. 4

Packer Machine Co. 12
Parker Rust Proof Co. 83
Parkin Co., William M. 114
Peninsular Chemical Products Co. 24
Pennsylvania Salt Mfg. Co. 45, 77
Phillips Chemical Co. 122
Phillips Manufacturing Co. 121
Pecimet Laboratories 101
Precision Paper Tube Co. 125
Procter & Gamble 119
Production Machine Co. 121

Quinn Co., Nelson J. 81

Randolph Finishing Products Co. 15
Ransohoff Incorporated, N. 63
Rayon Processing Co. of R. I., Inc. 103
Rheem Research Products, Inc. 105
Robinson & Son, A. 119
Rolock Incorporated 123
Roxalin Flexible Finishes, Inc. ..... Second Cover

Sarco Co., Incorporated 22
Solventol Chemical Products, Inc. 97
Sparkler Manufacturing Co. 113
Standard Electrical Tool Co. 89
Standard Steel Spring Co. 87
Standard Varnish Works 8
Sulphur Products Co., Inc. 20
Sun Oil Co. 69

Tobler Chemical Co. 120
Turco Products, Inc. 91

United Chromium, Incorporated 10, 73
U. S. Treasury Department 109

Varland, Seiwert & Roof 122
Verd-A-Ray Corporation 32

Wabash Appliance Corp. 11
Warner Electric Co. 123
Waverly Petroleum Products Co. 14
Wyandotte Chemicals Corp., J. B. Ford Division 53

Zapon Div. Atlas Powder Co. ..... Third Cover

35
85
71
33
117
99
57
116
16
2
98
1
4
12
83
114
24
45, 77
122
121
101
125
119
121
81
15
63
103
105
119
123
Cover
22
97
113
89
87
8
20
69
120
91
10, 73
109
122
32
11
123
14
58
d Cover
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BACK AGAIN!

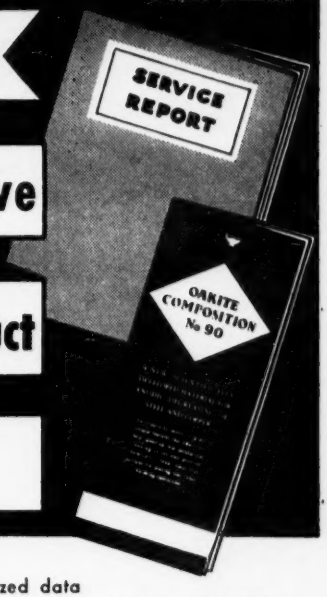
ROXYN-11C THERMOSETTING WHITE

THIS hard, direct-to-metal white enamel has solved many manufacturers' reconversion problems by meeting the following high quality standards! Tests prove it impervious to 900 hours of immersion in water and 1300 hours exposure to 100% humidity at 100° F. Its adhesion is excellent, withstanding the impact of a two pound steel ball dropped from a height of six feet; ultra-violet light for 24 hours (the equivalent of 45 to 60 days of direct sunlight!) doesn't touch it. ROXYN 11C heat cures in 30 minutes at 300° F. . . . draws to .300" without breaking. Write to department 953 for complete tecnhical information.

ROXALIN *Flexible* FINISHES
INCORPORATED
ELIZABETH, N. J. • NEW JERSEY

PIONEERS IN PRODUCT FINISHES ENGINEERED FOR SPECIFIC PERFORMANC

FREE! 2 OAKITE Aids to Help You Solve Your Reconversion Product Finishing Problems!



THESE two Oakite publications contain specialized data to help you solve diversified problems which the change to civilian production necessarily presents. Full of up-to-the-minute, practical information of techniques widely and successfully used!

Service Report Gives Details of Oakite CrysCoat Process

In ONE low-cost, time-saving operation, Oakite CrysCoat No. 86 removes light oils, grease and shop dirt . . . imparts a microscopic crystalline coating to steel or iron surfaces which prevents rusting and at the same time provides excellent and firm grippage for paint. ECONOMICAL . . . SPEEDS PRODUCTION . . . ELIMINATES paint adhesion failure due to incorrect surface preparation. Get the FREE Service Report giving essential details.

Precleaning of Steel and Copper Prior to Plating

If you are doing bright zinc, cadmium, hard chrome, nickel, copper plating or applying black oxide or similar finishes to steel or copper, you will find Oakite Composition No. 90 for ANODIC degreasing of surfaces gives FAST, THOROUGH smut removal . . . high conductivity . . . effective wetting-out and emulsifying action . . . long solution life. Get the FREE, 16-page concise Manual giving various applications, methods and directions for use.

SEND FOR THIS HELPFUL DATA!

You are invited to send for the Special Service Report and the Manual. Both are FREE . . . there is no obligation!

OAKITE PRODUCTS, INC., 40 Thames St., NEW YORK 6, N. Y.

Technical Service Representatives Located in All Principal Cities of the United States and Canada

Buy Bonds for Victory

Grains That Stay Longer on the Polishing Wheel...

ALUNDUM ABRASIVE

BECAUSE special treatments in the Norton manufacturing process increase the "sticking" power of Alundum Abrasive it is cutting polishing costs for many users. This ability to stay on the wheel head longer is just one of the plus features of Alundum Abrasive that result from progressive research combined with modern production facilities. It will pay you, too, to use Alundum Abrasive for polishing.

NORTON COMPANY
WORCESTER 6, MASS.

G-158

NORTON ABRASIVES

PROTECTING fixtures since plumbing came indoors . . .

Plumbing has come a long way since the days when facilities were "just a few steps" from the house. And the *manufacture* of *plumbing supplies* has greatly developed since the time when President Millard Fillmore installed the first full-size, iron bath-tub in the White House.

Serving the plumbing supplies industry since its earliest beginning and along every step of its great advance was the Hanson-Van Winkle-Munning Company, manufacturers of a complete line of electroplating and polishing equipment and supplies. Many problems of *protection by plating* stood as obstacles to the industry's development and Hanson-Van Winkle-Munning is proud of having aided in solving them.

The knowledge gleaned from this experience and from the experience of serving *all* industries of *all* kinds for one hundred and twenty-five years is at *your* service. H-VW-M is ready to work with you on your finishing and plating problems whether they call for layout and engineering of new departments or improvement of existing facilities.

Listed below are some of the highly authoritative H-VW-M technical papers and bulletins. Select the literature that has a bearing on your particular plating and finishing problem and write for it by number, without obligation.

HANSON-VAN WINKLE-MUNNING CO.

MATAWAN, NEW JERSEY

Plants: Matawan, New Jersey • Anderson, Indiana

Sales Offices: Anderson • Chicago • Cleveland • Detroit • Elkhart • Matawan Milwaukee • New Haven • New York • Philadelphia • Pittsburgh • Syracuse Springfield (Mass.)

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Buffs and Compositions ..... No. BC-104
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Cleaners ..... No. C-105
Conveyors (Semi-Automatic) ..... No. SA-101
Conveyors (Full Automatic) ..... No. FA-101
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Tanks ..... No. T-104
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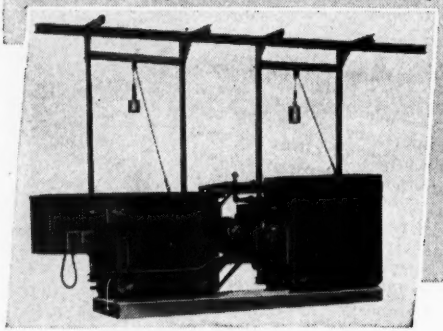
Wrap Rex ..... No. WR-102

A Speedier Operation with this



DIP-AGITATION and SPRAY COMBINATION

A large electrical products manufacturer had the problem of removing paint from coated racks. The OPTIMUS Dip-Agitating and Spray Units pictured above, operated in sequence, not only provided the answer, but gave a speedier operation.

The paint-coated racks are loaded in the basket and given a soak in the Dip-Agitating Unit. They are then transferred to the Spray Wash Unit where they are subjected to powerful sprays for complete removal of the loosened paint. The design keeps cleaning compartment entirely free of any obstruction, making it possible to lower a variety of objects into it quickly and simply.

In the Dip-Agitating Unit, to the soaking action in the cleaning solution is added a strong mechanical agitating action. A vertical up and down dipping motion of the load in and out of the solution speeds up the operation, handling the work in less time than normally required.

Any type of alkali, solvent or solvent-emulsion type cleaner can be used. Provision is made for temperature-controlled heating by any medium and for filtering the cleaning liquid. Adequate ventilation is provided. Overhead tracks can be used. These may be tied in with a shop track, or they can be used to pick up the load from the adjacent floor.

Easy to load, easy to heat, fast cleaning, less wearing parts, low agitation costs—these are some of the features these Units provide.

SEND FOR full details showing how these OPTIMUS Units can be adapted to these and many other applications in your plant operations.

OPTIMUS EQUIPMENT COMPANY

ENGINEERS AND MANUFACTURERS

132 CHURCH STREET, MATAWAN, N. J.

STANDARD AND SPECIAL TYPES OF EQUIPMENT FROM THE SMALLEST TO THE LARGEST SIZES FOR A WIDE VARIETY OF OPERATIONS.

OPTIMUS EQUIPMENT

FOR WASHING · RINSING · PICKLING AND DRYING OF METAL PARTS

In 1938, this Monel* basket went to work in hot hydrochloric acid.

War came. Changes were made at Seegar-Sunbeam Corporation, Evansville, Indiana.

No more pickling of *COLD-SPOT* refrigerator liners. The plant had a new job—turning out steel cartridge cases by the thousands.

The Monel basket was switched to hot caustic solutions and Bonderizing operations. And it's still on the job today . . . *serving as dependably as it did 7 years ago!*

You can make switches like that . . . when you have Monel equipment. Monel has high resistance to hydrochloric acid, sulfuric acid and other commonly used pickling solutions.

But high corrosion resistance is not the only property of Monel. It has plenty of *strength* and *toughness*. You can build compact, lightweight equipment. You'll get a bigger load into each basket. What's more, baskets will last longer.

And the use of Monel means *economy*, too. For baskets, crates and racks can almost always be made of standard mill forms, and fabricated by ordinary shop methods.

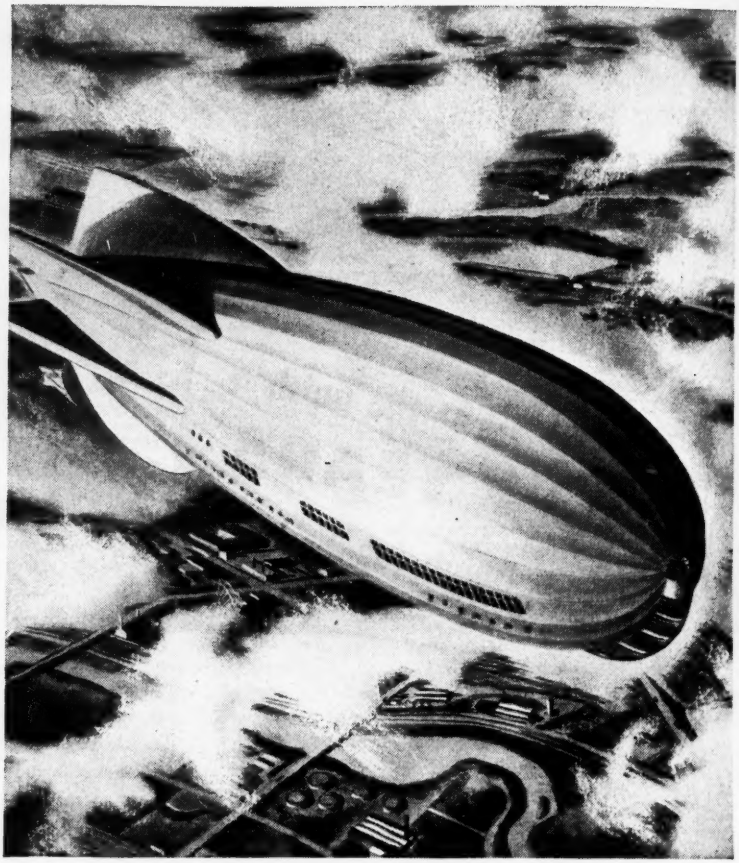
Write us for further information. Chances are, there's a job for Monel in *your* pickling department. The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.

*Reg. U. S. Pat. Off.

Monel

ONE OF THE INCO NICKEL ALLOYS

Do you know...?

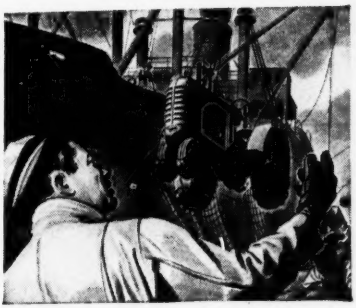


Q. Airships are capable of carrying pay loads on non-stop flights of:

☐ 1,000 miles ☐ 5,000 miles ☐ 8,000 miles

A. 8,000 miles. After the war, experts predict that transoceanic passenger and freight service by airship will be established all over the world. Greatly increased capacity and decreased operation costs have been made possible by new developments in engines, metal alloys and construction. One such development—small but important—is the use of Permacel pressure-sensitive tapes in the construction of airship fins and rudders. Permacel cloth tape (Jonflex) and Permacel's companion, Texcel cellophane tape, are applied over rivets and joints on ribs to prevent damage to the fabric from friction.

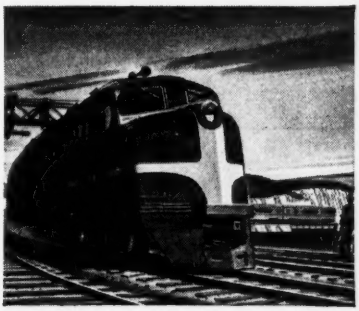
No. 16 in a series



Q. Biggest pre-war obstacle to shipping machinery overseas was:

☐ Corrosion ☐ Storms ☐ Tariffs

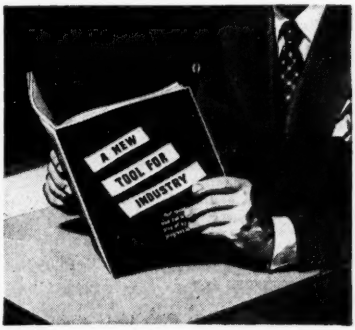
A. Corrosion. But this is no longer true. Today, Permacel moisture-proof cloth tape (Utilitape) is used to seal vents and openings in metal — seals outside moisture, assures arrival of materials in good condition.



Q. What part will color play on streamlined trains of tomorrow?

☐ Speed ☐ Decoration ☐ Insulation

A. Colors give beauty and individuality to interiors and exteriors of railway cars and locomotives. Jobs calling for two or more colors can be done quickly, neatly and economically with Permacel paper masking tape.



Q. The title of this booklet refers to:

☐ Electricity ☐ Tape ☐ Wrenches

A. Pressure-sensitive tape. This booklet shows how Permacel Industrial Tapes help speed production and cut costs all along the production line. Illustrates many uses that may prove helpful in *your* business. Write for your free copy: Dept. PF-16, Industrial Tape Corporation, New Brunswick, N. J.

IMPORTANT: *Our research laboratories are at your disposal for development of special tapes to meet war and postwar needs.*

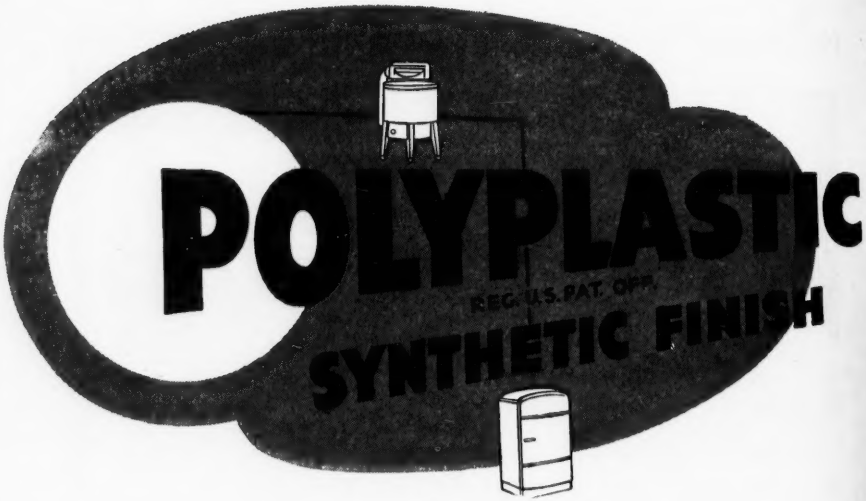
Permacel Industrial Tapes

INDUSTRIAL TAPE CORPORATION

New Brunswick, N. J.

Makers of **Texcel Tape**

"PERMACEL" REG. U. S. PAT. OFF.



What You Have Been Waiting For ---

AVAILABLE NOW!

not a substitute—not an imitation — not an emergency stop-gap — POLYPLASTIC is a war finish now released for the products consumers are longing for—washing machines, mixers, vacuum cleaners, refrigerators, office appliances and other products that require a super finish.

POLYPLASTIC Synthetic Finish not only gives lasting protection with brilliant beauty — it gives it *F-A-S-T*. Also obtainable as a unique *monobake* finish—primer and finishing coat baked in one operation—cuts oven time in half.

POLYPLASTIC is not temperamental in the oven, slight temperature variations make no difference in color and lustre.

In white and standard colors.

Your inquiry is invited.

STANDARD VARNISH WORKS

2600 RICHMOND TERRACE
STATEN ISLAND, N. Y.

2600 FEDERAL STREET
CHICAGO, ILLINOIS

SINCE 1870

Engineers of Product Finishes

STRIP FAST

Without Rusting

ENTHONE ZINC STRIPPER PATENT PENDING

strips zinc plate and coatings from *steel FAST* without etching or staining the base metal. The stripper is alkaline and does not cause rusting of the steel.

Hydrogen embrittlement is not experienced with Enthone Zinc Stripper, whereas acid stripping leads to serious embrittlement of certain steels. The Enthone Company, Dept. PF, 440 Elm Street, New Haven 2, Conn.

ENTHONE

Write for New Literature

HOLDS THAT LINE!

UNICHROME *

"QUICK DRY" STOP-OFF 322

Makes Your Work Easier, Faster, Better

Tight-holding, clean cutting edges that won't budge a whisker—not even for the toughest plating solutions — that's what Unichrome Stop-Off 322 gives you. This helps you do more accurate work—faster, easier. And besides, Unichrome is most convenient to use. Simply brush, spray or dip. At room temperatures, too. Another thing — it dries fast. Finally, there's no peeling or seepage with Unichrome Stop-Off 322 on the job.

Let us put you down for a trial shipment. See these advantages for yourself. There's a heavy war demand for the new and improved resins in Unichrome Stop-Off 322. But, we'll rush it to you as fast as possible. Write our nearest office for prices and complete data.

*Reg. U.S. Pat. Off.

PROPERTIES

Chemical Resistance — Excellent in all plating cycles.

Application—Can be brushed, sprayed or dipped.

Drying—Dries quickly at room temperature — adheres without force drying.

Stripping — After plating, material may be removed by dissolving in Remover 322 R A.

UNITED CHROMIUM, INCORPORATED

51 East 42nd St., New York 17, N. Y. • 2751 E. Jefferson Ave., Detroit 7, Mich. • Waterbury 90, Conn.

TRY THESE OTHER UNICHROME MATERIALS

Unichrome Quick Dry Stop-Off 323—for chromium and other plating work requiring a stop-off that can be peeled off after use.

Unichrome Air-Dry Rack Coating 203 — a rack insulation that can be dipped and dried at room temperature, for use in all plating solutions.

Unichrome Coating 202 — a new rack insulation similar to Air Dry but which is force dried to obtain the extra adherence required in anodizing and hot, strongly alkaline solutions.

Unichrome Resist — a solid insulating material for constructing composite racks, stop-off shields, insulating gaskets, etc.

Wabash Birdseye Infra-Red Heat Lamps

Save Time
Save Space
Save Money

With old-type methods it used to take 1 hour 15 minutes to bake the finish on stove cabinets in the Queen Stove Works, Albert Lea, Minn. Then forward-looking plant engineers installed Wabash-Birdseye Infra-red Heat Lamps. Now the same operation is done more uniformly, in less space, by one man instead of four—and *in only 15 minutes!* Another dramatic example of the benefits which Wabash-Birdseye Infra-red Heat Lamps — industry's newest tool for baking, drying, dehydrating—can contribute to American industry.

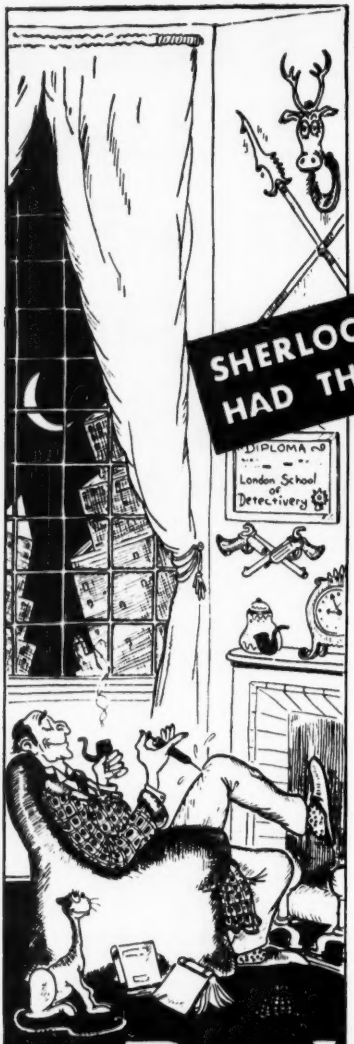
Wabash-Birdseye Infra-red Heat Lamps are standard for most Infra-Red tunnels, ovens, and other production line installations. In adapting your equipment to achieve the really dramatic results possible with Infra-Red, remember that Infra-Red heating is a science; and, *for maximum efficiency, Wabash-Birdseye Lamps should be used with scientifically engineered equipment.* We will gladly furnish names of manufacturers of such equipment.

WABASH APPLIANCE COMPANY

345 CARROLL STREET, BROOKLYN 31, N. Y.

WABASH-BIRDSEYE

First in INFRA-RED

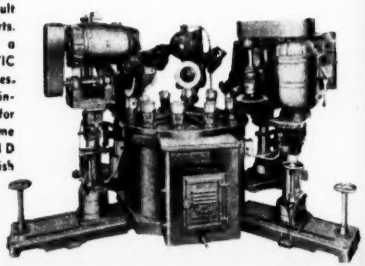


FOR *Automatic* POLISHING AND BUFFING

SHERLOCK HOLMES HAD THE "DOPE"...

Sherlock Holmes' successful career in the detection of crime was due entirely to his uncanny ability to make correct deductions. We, too, have made a deduction... of a different kind, but equally successful. We have deducted most of the hand labor from polishing and buffing... and, believe us, the amount of labor these operations required really WAS a crime.

Speed-up Production. Lower costs on your difficult to finish parts. There's a PACKER-MATIC for all shapes, metals and finishes. WRITE for Factory Time Study — SEND Part and finish desired.



No. 2-12 ROTARY INDEXING TYPE

Packer-Matic

THE PACKER MACHINE CO., MERIDEN, CONN., U. S. A.

Now..a white enamel that really *Lasts Longer*

● For the longest-lasting synthetic white enamel ever offered product finishers, specify White Nubelite by Glidden. This superior synthetic enamel is a far more durable finish because it is especially formulated to resist high heat, salt spray, grease vapors, sunlight, excessive humidity, fruit acids and other elements which shorten the life of ordinary enamel.

A carefully blended combination of liquid plastic, Nubelite stays white indefinitely . . . does not lose its lustre or become brittle. Superior performance has made it a preferred finish for stoves, metal cabinets, refrigerators and other household appliances.

Available *now,* Nubelite may be just the finish to give your post-war product added eye appeal. *Write for complete details today!*

THE GLIDDEN COMPANY • Cleveland 2, Ohio

TIME-TESTED

GLIDDEN ★ *Pacemaker in Paints*

TROXIDE

The Safe, New, Effective Pickling Agent

UNIFORM PICKLING

OVER-PICKLING

TROXIDE

ORDINARY PICKLER

SAFETY IN HANDLING AND STORAGE . . . complete protection for men and equipment . . . these are only two of the features that make TROXIDE the ideal pickling-agent for industry. A scientifically developed compound of dry, inert chemicals, TROXIDE becomes active *only* when dissolved in water, and can be stored and handled as safely as a barrel of flour!

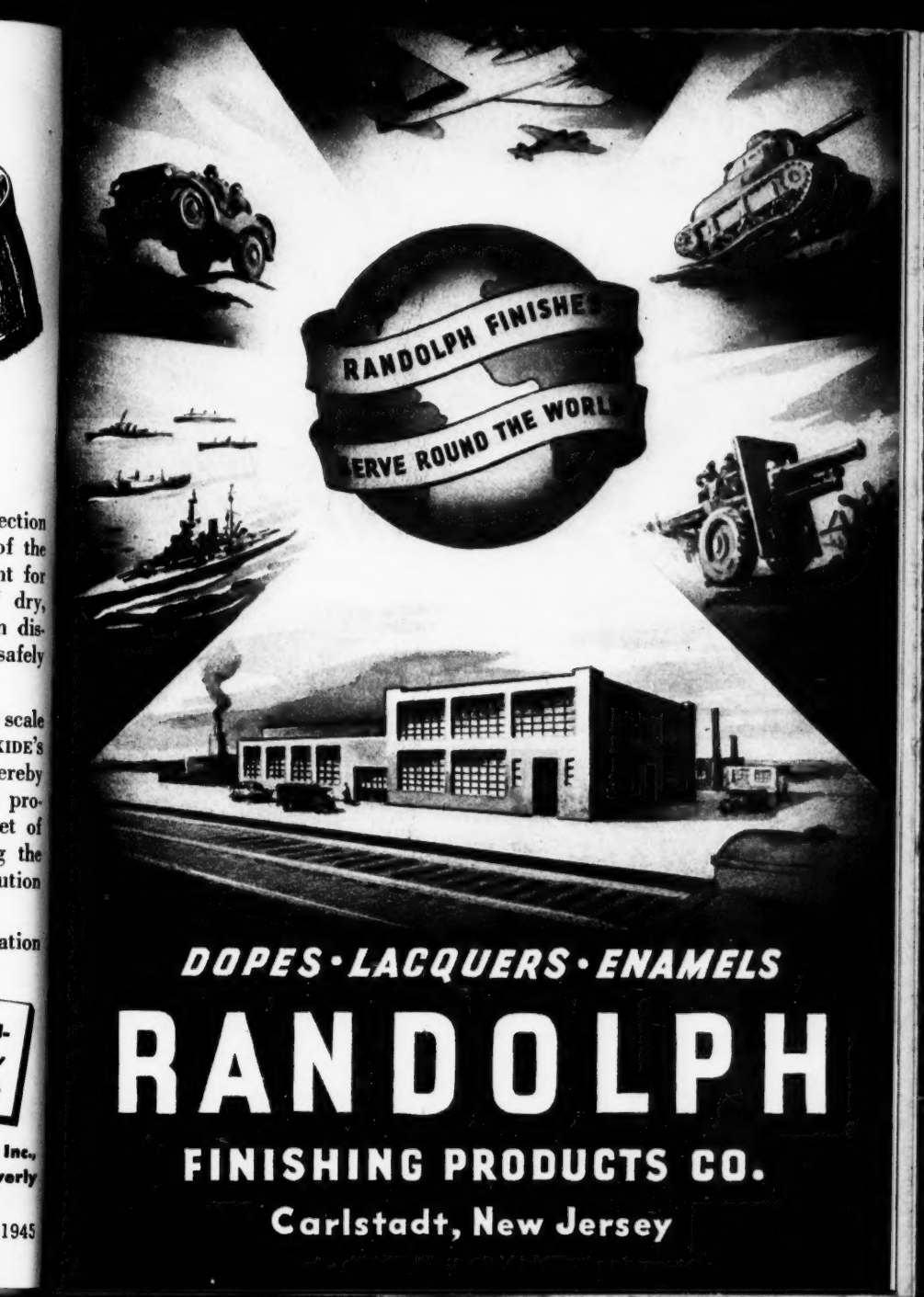
When dissolved in water, TROXIDE removes rust and scale from ferrous, non-ferrous and precious metals. TROXIDE's action slows when clean metal is reached . . . thereby reducing the danger of overpickling. And while it is working, TROXIDE protects workers and equipment from acid hazards by spreading a blanket of safety, called "PROTECTOFOAM," over the pickling solution, preventing the escape of acid particles into the air, and returning them to the solution for useful work.

Non-inflammable and non-eruptive, TROXIDE in solution forms a combination of the sulphuric and muriatic acid types. A TROXIDE solution equal to the conventional acid-bath cleans a bigger surface area . . . without the acid hazards of the ordinary pickling solution.

Pin your business card to this advertisement and send it to us today for the complete TROXIDE story.

TROXIDE

SUPPLIERS — *East:* Safety & Maintenance Co., Inc., New York 1, N. Y. *South, Midwest & West:* Waverly Petroleum Products Co., Philadelphia 6, Pa.



DOPES · LACQUERS · ENAMELS

RANDOLPH

FINISHING PRODUCTS CO.

Carlstadt, New Jersey

TRY THIS

on your PAINT FINISH

METALPREP
•
GALVAPREP
•
PREPRITE
•
PREPWASH
•
PREP-PIK-L
•
ALUMIPREP

Area A (above) shows metal after ordinary cleaning with solvents, naphthas, alkali, etc.
Area B is the same metal, Prep treated and cleaned.

Area A-1 is an impact tests showing embrittlement and poor adhesion of paint after ordinary cleaning.

Area B-1 is the impact test showing no embrittlement and excellent adhesion of paint with Prep cleaning and treatment.

The above tests prove why Prep Products have gained such widespread acceptance. Paint failure occurs when least expected and usually after the articles have been in service for several weeks or longer. Prep Products are a safeguard against high refinishing costs.

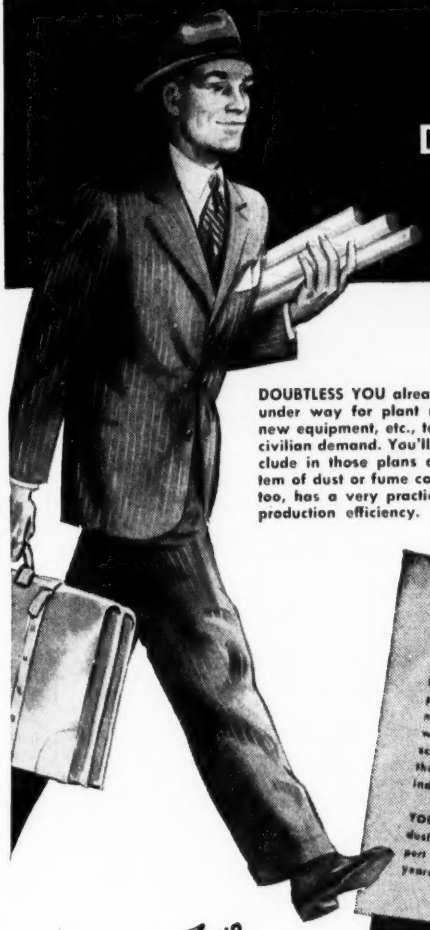
NEILSON CHEMICAL CO.

6564 BENSON ST., DETROIT 7, MICHIGAN

Windsor, Ont. **Los Angeles, Calif.**

MEET KEENER COMPETITION

DUST and FUME Control



DOUBTLESS YOU already have plans under way for plant modernization, new equipment, etc., to meet coming civilian demand. You'll be wise to include in those plans a modern system of dust or fume control—for this, too, has a very practical bearing on production efficiency.

DUST AND FUMES not adequately controlled lower the output of workers, increase costs, add to health and accident hazards, and induce overly rapid deterioration of machinery and equipment.

IN INDUSTRIES everywhere, dust and fume control systems planned, designed, and installed by Kirk & Blum Air Engineers are right now paying for themselves in increased worker efficiency and maintenance of still production schedules. K & B systems give superior service because they are custom-built to fit the particular needs of each individual plant.

YOUR ONE BEST assurance of complete satisfaction in dust or fume control lies in the unbiased counsel and expert planning of Kirk & Blum Engineers—backed by 38 years of professional "know how". Write for details.

KIRK AND BLUM

The KIRK & BLUM Mfg Co.
2816 SPRING GROVE AVENUE,
CINCINNATI 25, OHIO

Reflecting the Integrity of the Maker

Each time you see the Harshaw trademark, whether on tank car, package or small laboratory bottle, remember it identifies chemicals that will help to do a better job . . . truly reflecting the integrity of the maker.

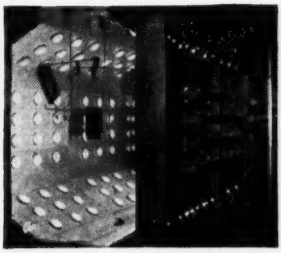
Harshaw will always guard the quality of its chemicals . . . chemicals which you identify by the Harshaw trademark . . . and which you buy with confidence. For more than 50 years Harshaw has persevered in ceaseless research and field investigation. As a result, thousands of manufacturers have been supplied with hundreds of different chemicals which have helped them . . . and which in addition have proved a source of satisfaction to them and to us.

★ ★ ★ ★ THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES ★ ★ ★ ★

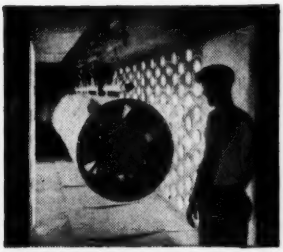
HOW TO PUT THE HEAT ON PLANT PRODUCTION

Consider these 4 basic uses for versatile G-E Infra-red Lamps. They can help you increase your output, save time and reduce costs

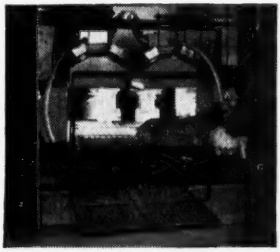
1 Radiant energy speeds up dehydration processes. G-E Infra-red Lamps are ideally suited for large or small installations. Extremely low maintenance costs.



2 Save floor space. This drying oven equipped with G-E Lamps provides high production capacity per square foot of floor area. Installations are movable, flexible and adaptable.



3 This baking oven—using efficient G-E Infra-red Lamps—provides more comfortable working conditions. No excessive warmth around oven. Clean operation and better appearance.



4 Avoid time losses. G-E Infra-red Lamps start and stop instantly—no warm-up needed. This saves time and reduces costs in heating operations such as shown above.

CONSULT an infra-red oven manufacturer — proper oven design is important to successful operation. General Electric recommends that you call on a recognized oven manufacturer to assure the best results with G-E Infra-red Lamps. For information on particular applications, get in touch with your nearest G-E lamp office.

G-E Infra-red Lamp R-40, 250 watts. Efficient reflector hermetically sealed in bulb. Durable, economical, easy maintenance. Smooth, even distribution of radiant energy. Suitable for all types of infra-red installations.

G-E LAMPS **BUY MORE WAR BONDS**

GENERAL ELECTRIC

Hear the G-E radio programs: "The G-E All-Girl Orchestra," Sunday 10:00 p. m. EWT, NBC; "The World Today" news, Monday through Friday 6:45 p. m. EWT, CBS; "The G-E Houseparty," Monday through Friday 4:00 p. m. EWT, CBS.

"The Copper Strip of Today"

McKeon's "Liquid Sulphur"

TRADE MARK REG'D.

GUARANTEED! Today's copper stripping method. Prove its possibilities. Send samples of your particular job from which you want copper removed. We remove the copper, return it together with directions, showing how your men in your plant can proceed in removing copper plating on your particular requirement. Strip "worry" from your copper stripping job!

WRITE! PHONE! WIRE!

SULPHUR PRODUCTS COMPANY

GREENSBURG, PA.

GOT YOUR FREE COPY?

AVAILABLE TO ALL BONA FIDE MANUFACTURING PLANTS TELLS HOW EASY IT IS TO IDENTIFY, SPECIFY AND ORDER COATED ABRASIVES BY "CARBORUNDUM"

IT illustrates the markings for Coated Abrasives by "CARBORUNDUM." How these products are easily *identified* by end use... *clearly marked* with the specifications on both package labels and backing material... *easy to order* because you know exactly what you are using.

In addition this new book gives you information you will find helpful concerning Coated Abrasives by "CARBORUNDUM" and their wide range of uses. If you have not yet received your copy, be sure to write us today. The Carborundum Company, Niagara Falls, New York.

ABRASIVE TOOLS FOR METALWORKING

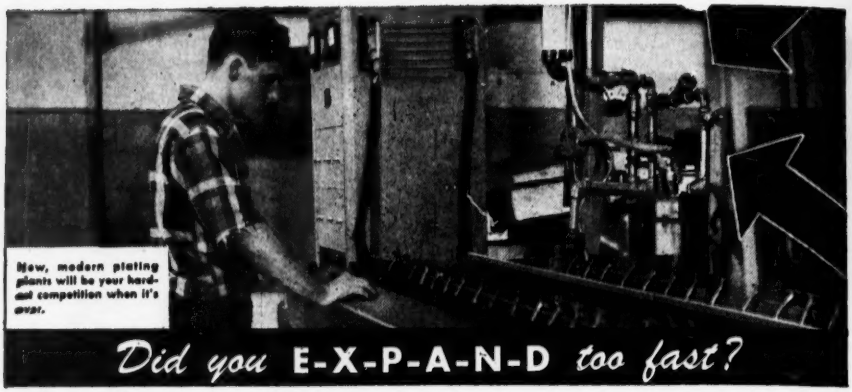
METAL CLOTH... SANDER DISCS... INDUSTRIAL CLOTH... POLISHING PAPER ... CROCUS CLOTH ... WATERPROOF PAPER ... SLEEVES ... CARTRIDGE ROLLS ... SLOTTED DISCS ... CLOTH DISCS ... CONES ... CRANKSHAFT ROLLS... "ECONOMY" ROLLS ... EMERY CLOTH ... INDUSTRIAL CLOTH BELTS

HERE'S WHAT'S IN IT!

1. Sanding and Finishing Processes.
2. Abrasive Grains.
3. Classification of Grain Sizes.
4. Bonding Materials.
5. Coatings.
6. Backing Materials.
7. Flexing.
8. Suggestions for stocking.
9. How to identify and specify Coated Abrasive Products by "CARBORUNDUM."
10. Recommendations for Belt Splices.
11. Machine specifications for Belt Sanding.
12. Specifications for Standard Coated Abrasive Products.

THERE IS A PRODUCT BY
CARBORUNDUM
TRADE MARK
FOR EVERY ABRASIVE APPLICATION

("CARBORUNDUM" is a registered trade mark of and indicates manufacture by The Carborundum Company)



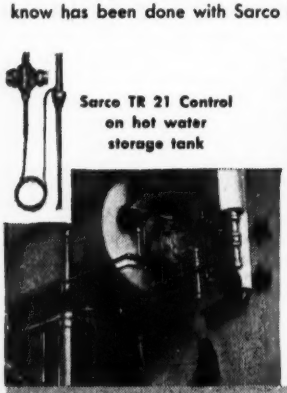
Did you E-X-P-A-N-D *too fast?*

The contribution of the plating industry to the war effort will never be completely told. Production was doubled and trebled overnight—without time to engineer the job for efficiency, and with many needed accessories not available.

When it is over, only the more efficient plating plants will survive. Faster plating, more automatic, more exacting tolerances and lower costs will be demanded—and obtained.

These strong statements are based on what we know has been done with Sarco in the past few years. From hot water storage tanks to simple wash tanks, and exacting chrome plating to anodyzing, there is a Sarco temperature control that is inexpensive, easy to install and simple to adjust and operate.

You can speed up production, eliminate rejects and reduce fuel costs by the addition of Sarco equipment to your present installation. The Sarco representative will study your plant — make recommendations—save you time and money without obligation.



Sarco TR 21 Control on hot water storage tank

Sarco No. 87 Control on caustic tank

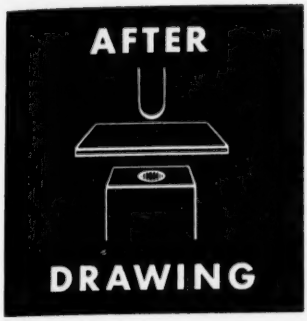
Sarco Electric Control on chromium plating tank

SARCO COMPANY, INC.
475 FIFTH AVENUE
NEW YORK 17, N. Y.

Represented in Principal Cities

SARCO Saves Steam

SARCO CANADA, LTD., 28 Richmond Street, West, TORONTO, ONTARIO



VAPOR DEGREASING
WITH TRICHLORETHYLENE!

This efficient cleaning method speeds production—saves cost!

1. Thoroughly removes grease and oil from metal parts of any size or shape, often in less than one minute.

2. Produces parts clean, warm and dry—ready for inspection, assembly, further fabrication or finishing of any type.

3. Minimizes finishing rejects because solvent reaches and removes grease and oil from deep draws, holes and almost inaccessible places.

4. Reduces risk of damage to delicate parts.

5. Can be used alone or as a part of a process flow line.

6. Utilizes compact equipment.

7. Consumes only small quantities of solvent. Contaminated solvent is reclaimed economically.

8. Uses absolutely pure vapors of a non-flammable solvent as a cleaning medium.

9. Simplifies cleaning procedure, is easy to operate as a process.

10. Saves time and cost in its own operation, and in the subsequent handling and finishing of parts.

AFTER THIS and nearly every other fabricating and finishing operation, Vapor Degreasing saves time and cost—boosts production. This superior cleaning method yields parts clean, warm and dry, ready for the next step. And you need only specially designed equipment and degreasing grades of Trichlorethylene or Perchlorethylene.

Clip the coupon below for your free copy of "Metal Degreasing—Standard Practices." It will show you how Vapor Degreasing may cut costs, raise output in *your* plant, just as it does in a host of others.

E. I. DU PONT DE NEMOURS & CO. (INC.)
Electrochemicals Department
Wilmington 98, Delaware

DU PONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

CLIP THIS COUPON

E. I. du Pont de Nemours & Co., (Inc.)
Electrochemicals Department
Wilmington 98, Delaware

Please send me my copy of "METAL DEGREASING—STANDARD PRACTICES."

Name_____ Position_____

Firm_____

Address_____

NEW Speed and Economy on ALL Selective Plating Jobs with Pen-Kote MASKING LACQUERS

Eight Pen-Kote Masking Lacquers provide for faster, trouble-free production on *all* selective plating jobs—at appreciably lower cost. These new lacquers are regularly available for

- **HARD CHROME** stop-off (four superior coatings meet every requirement).
- **COPPER AND CADMIUM** stop-off—including high-temperature copper.
- **TIN AND ZINC** stop-off—where superior resistance to high-caustic solutions is required.
- **SILVER** stop-off—a lacquer of exceptional dielectric strength in high-cyanide solutions.

ALL Pen-Kote Masking Lacquers are easy to apply and unusually quick-drying. They adhere firmly, yet peel freely and are quickly removed after plating. They can't contaminate solutions or tarnish the work, and provide a durable, perfect protective coating of high dielectric strength.

WRITE TODAY FOR FULL DETAILS

Pen-Kote PRODUCTS

PENINSULAR CHEMICAL PRODUCTS CO.
6795 EAST NINE MILE ROAD
VAN DYKE • MICHIGAN

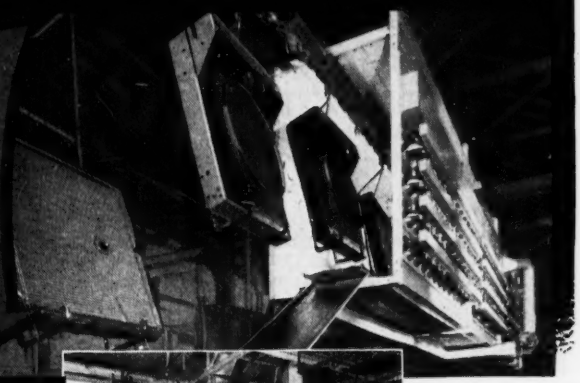
4 DEFINITE ADVANTAGES

Gained from

C. M. HALL

Radiair

OVENS



Hall Radiair Ovens always incorporated *time-saving* infra-red heat plus the *extra-use* value of recirculated, derived heated air.

1

2

3

4

HALL RADIAIR OVENS PRODUCE FASTER, BETTER DRYING and BAKING

Infra-red provides *instant, uniform* heat . . . speeds and improves production.

At Long Manufacturing, Detroit, RADIAIR ovens demonstrate the effectiveness of Hall economy-engineering. As part of the in-line production process, these ovens, suspended from the ceiling, *saved 400 sq. ft. of valuable floor space.* Long radiators of different sizes and shapes . . . for automobiles, trucks and buses . . . pass through the same ovens with thoroughly uniform results. Surface moisture is dried in one oven; paint finish is baked in another. Formerly, drying and baking operations required 6 minutes each in a steam oven; now each operation takes only 3 minutes in a RADIAIR oven.

If *you* use or are considering low-temperature heating, get suggestions from Hall on the better way to do the job.

SEND FOR "INFRA-RED AT WORK"

This 28-page booklet describes many practical applications. *Write today* for a copy.

C. M. HALL LAMP CO.

C·M·HALL *Lamp Company*

1025 EAST HANCOCK ST. ***Representatives in Principal Cities*** **DETROIT 7, MICHIGAN**

Du-Lite Scores Again

New Process for Black Finishing Copper Alloys Without Copper Plating Proves 100% Successful

This process which has been exhaustively tested in our laboratory and in actual use has now demonstrated beyond any question that it is 100% efficient.

Every copper alloy sample submitted to us for trial finishing has been satisfactorily black oxidized with our new Du-Lite Chemifinish.

Until you have seen some of your own products and parts finished by this new process, you cannot appreciate what is now possible. Send *your* samples for processing—no obligation.

PHOSTEEL — A New Chemifinish

This new Phosphate type finish has created great interest. It has many advantages both for bonding purposes and as a final finish with oil.

Send for information about Phosteel and the new Black finish for copper alloys. These as well as all Chemifinishes are comprehensively treated in the Du-Lite Fact Book—a practical handbook for the Metal Finisher.

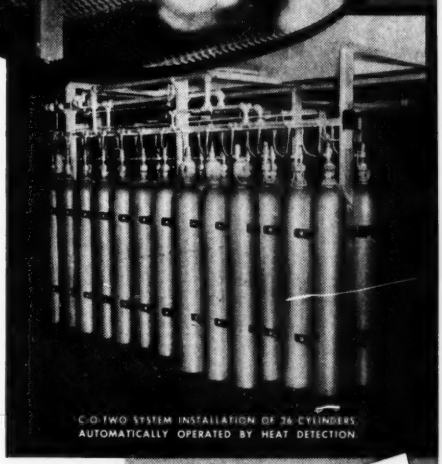
DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONNECTICUT

Hot shells take an oil bath!

C-O-TWO HORN TYPE NOZZLES MOUNTED OVER CONVEYORS AND ABOVE OIL-FILLED QUENCHING TANKS.

BUT Protected Against Fire

Still red hot on the conveyor belt from heat-treating furnaces, shells for the big guns of the Army, Navy, Maritime Commission and Coast Guard are submerged in quenching tanks filled with flammable oil! During this hazardous process the oil frequently becomes ignited from the glowing hot shells. Every precaution must be taken to prevent a holocaust arising from these conditions. Over this entire process, C-O-TWO fire extinguishing systems maintain a constant vigil, ready at a second's indication of fire to go into immediate action; detecting the blaze, automatically shutting down conveyors and oil circulating pumps while simultaneously releasing carbon dioxide gas which kills fire in its tracks. C-O-TWO does all this in a matter of seconds, for even blazing oil fires cannot withstand the flame killing blasts of dry, sub-zero carbon dioxide gas which stops fire on the spot without damage to any type of equipment or materials.



C-O-TWO SYSTEM INSTALLATION OF 26 CYLINDERS, AUTOMATICALLY OPERATED BY HEAT DETECTION.

C-O-TWO carbon dioxide fire extinguishing equipment portables, wheeled units, hose reels and systems are protecting the country's largest manufacturing plants, war industries, arsenals and are used by our Armed Forces on land, sea and in the air. C-O-TWO provides fire protection where lives, time, valuable equipment and vital materials are at stake. Write for information.

C-O-TWO is a Registered Trademark and corporate name of this company. C-O-TWO equipment is fully approved and listed by Underwriters laboratories and Factory Mutuals.

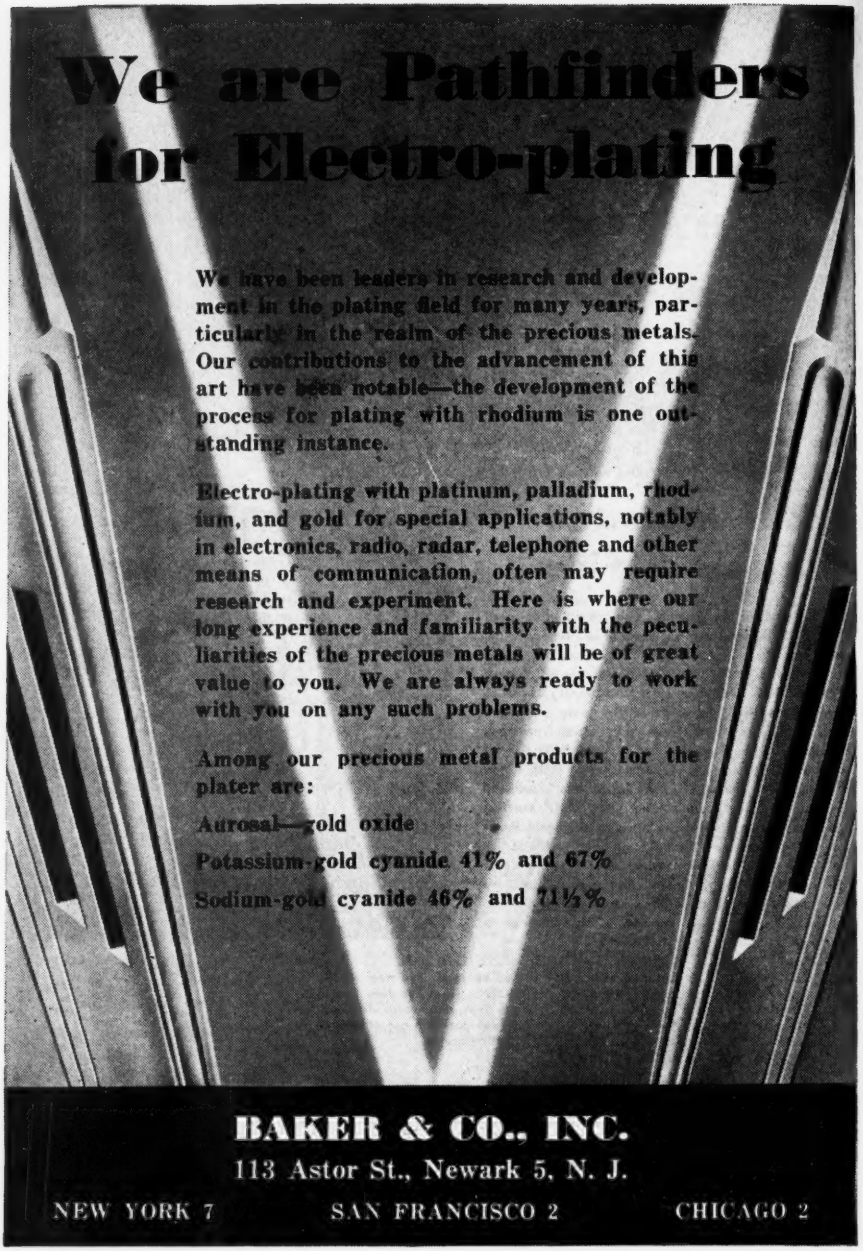
C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

C-O-TWO


We are Pathfinders for Electro-plating
We have been leaders in research and development in the plating field for many years, particularly in the realm of the precious metals. Our contributions to the advancement of this art have been notable—the development of the process for plating with rhodium is one outstanding instance.
Electro-plating with platinum, palladium, rhodium, and gold for special applications, notably in electronics, radio, radar, telephone and other means of communication, often may require research and experiment. Here is where our long experience and familiarity with the peculiarities of the precious metals will be of great value to you. We are always ready to work with you on any such problems.
Among our precious metal products for the plater are:
Aurosal—gold oxide
Potassium-gold cyanide 41% and 67%
Sodium-gold cyanide 46% and 71⅓%
BAKER & CO., INC.
113 Astor St., Newark 5, N. J.
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New Portable INFRARED UNITS

For Baking - Drying Dehydrating - Preheating

FOSTORIA

Evenray **Model 62-247**

Other models available with radiation coverage up to 2000 sq. in.

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MOVE ANYWHERE
TILT IN ANY DIRECTION
PLUG IN AND TURN ON

★

Ideal for Multiple Heating Operations in Shop, Laboratory and Service Departments

Use this new high efficiency production tool for baking lacquer, enamel and other finishes; drying latex, glue, ink, sand moulds etc.; preheating plastics, metal fittings, glass, oil, etc.; dehydrating textiles, chemicals, clay, etc. You'll do it faster, better, more conveniently with Infrared.

In over 4,000 industrial plants, Fostoria Evenray equipment is now providing amazing benefits in modern heat application. Request full facts.

Write for descriptive catalog of all models

THE FOSTORIA PRESSED STEEL CORPORATION
FOSTORIA, OHIO

Independently Affiliated Manufacturers:
Southern Industries, Inc., Atlanta, Ga.
Amalgamated Electric Corp., Ltd.
Toronto, Canada
EXPORT SALES DEPT.
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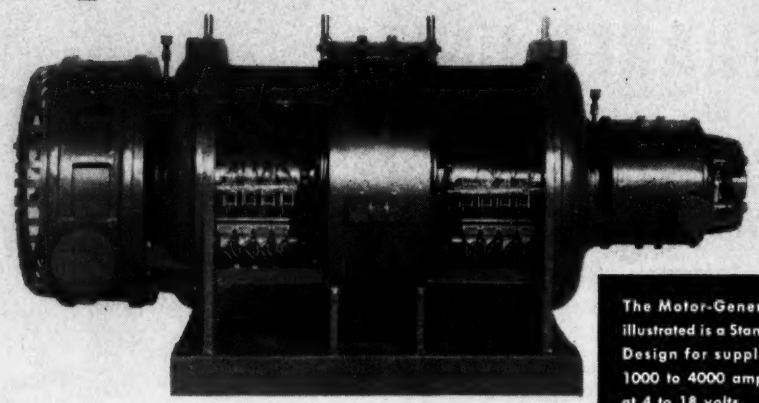
Highest Efficiency in the Utilization of INFRARED RADIANT ENERGY

EVENRAY SYSTEM
fostoria
FOR BAKING • DRYING • PREHEATING • DEHYDRATING

Trade Mark Reg. U. S. Pat. Off.

NEMA

Φ MOTOR-GENERATORS



The Motor-Generator illustrated is a Standard Design for supplying 1000 to 4000 amperes at 4 to 18 volts.

Provide More for Less

SINCE 1904, E. P. Motor-Generators have been proving continuously that they provide MORE plating value for LESS overall cost . . . that they:

1 ASSURE A LOWER LIFE-TIME COST
The minimum life expectancy of E.P. Motor-Generators is at least 15 years *with no replacement of major parts.*

2 CONSUME LESS ELECTRICITY
E.P. Motor-Generators have a minimum guaranteed lifetime efficiency of 75%. Savings from this high efficiency will frequently amortize the complete investment in only a few years.

3 PROVIDE MORE AMPERES PER DOLLAR
Motor-Generators, because of their inherent reserve capacity, can handle safely the frequent heavy overloads required in plating service.

4 RAISE LOW POWER FACTOR
E.P. Generators, 750 amperes and above, are driven by synchronous motors which supply power factor correction at no extra cost.

5 MINIMIZE PLATING COSTS
Since the amount of amperes that flow through a plating solution varies with the voltage, the constant voltage of E.P. Plating Generators assures the same rate of deposit at all times, and thereby the *lowest plating cost.*

6 REQUIRE NO SPECIAL PROTECTIVE EQUIPMENT
Experience has proved that E.P. Motor-Generators can operate safely under the extreme conditions common to most electroplating operations. High room temperatures do not affect them. They do *not* require expensive forced-draft ventilating systems.

7 NEED PRACTICALLY NO MAINTENANCE
Operator after operator has gone on record that year after year, the only maintenance required for E.P. Generators is a periodical oiling and an occasional replacement of brushes.

For full details regarding these Seven Points, ask our Representative, or write for Bulletin 204, a copy of a talk given before the Cleveland Electroplater's Society entitled "More for Less." x-8

The Electric Products Co.

1741 CLARKSTONE ROAD • CLEVELAND 12, OHIO

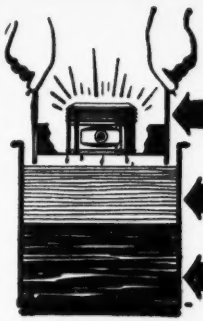
GUNK H. S. DUNK

FOR CARBON DEPOSITS, OIL VARNISH, CLOGGED OIL LINES
FUEL PUMPS, CARBURETORS, OIL COOLERS, FUEL INJECTORS

GIVES A COMPLETE STRIP
— not a strip tease

HARMLESS TO ALL METALS
Tough on Tar, Carbon

GUNK has been doing an outstanding job for the Army and Air Forces — exceeds latest Government degreasing and decarbonizing specifications. Comes ready to use with patented dunking screen in 5 gal. container—the only complete decarbonizing package outfit.



GUNK Dunk is easy to use

The dunking screen that comes with the kit.

The hydro-seal—a water base blanket that forms on top like cream on milk and prevents evaporation of concentrate, rinses work.

GUNK (H-S) DUNK, digests carbon, gum.

THE CURRAN CORP.

Manufacturing Chemists

MALDEN 48, MASS.

Makers of:
GUNK-Spray, *self-emulsifying chemi-cleaner.*
GUNK-Dunk, *carbon gum digestant.*
MOTOR-FIZIK.

HOW TO BUY . . . ASK YOUR JOBBER SALESMAN
or Use Self-Service Coupon for Express Shipment
THE CURRAN CORP., Malden 48, Mass.

Not in stock at my jobber . . . attached to my business letterhead is my check or M.O. on the condition that you ship me by FAST PREPAID RAILWAY EXPRESS a 5 gal. size GUNK H-S Dunk-Kit at dealer's net cost—$9.90 (add 10% west of the Mississippi).

Name _____

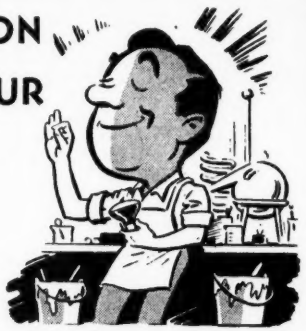
Firm _____

Street _____

City _____ State _____

17 REASONS WHY IT'S DIFFERENT

AND EVERY REASON IS INDICATED BY OUR PATENT CLAIMS ON THIS DESIGN



PENETRAY

Reduced glare is an important reason for your selection of a Specific Near Infra-red source. Next, for baking, drying and evaporating, a radiant source peaking between 13,000 and 14,000 Angstrom Units is most desirable. These are two definite reasons for your use of Penetray.

Penetray production is unusually costly because of filament and construction detail. This, in our opinion, is necessary to a quality product. Lamp life and efficiency is improved - resistance to vibration being maximum. A nonex arbor protects against softening of glass and resulting distortion of filament due to sagging. Radiant energy is emitted in both the vertical and horizontal.

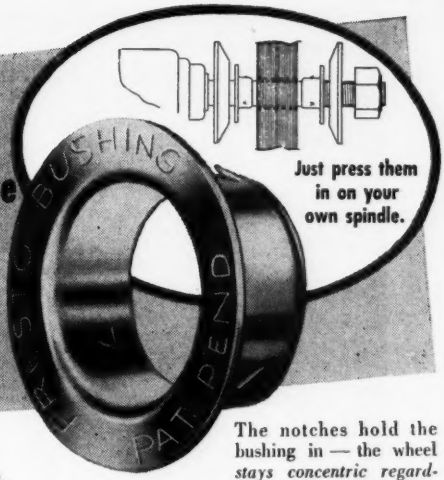
Honestly, now, don't you want to know more about this new product and the prospect of improved results?

INFORMATION ON REQUEST - WITHOUT OBLIGATION

LEARN TO SAY "PENETRAY"

VERD-A-RAY CORPORATION — TOLEDO 3, OHIO

Keep Spindles like New
Keep Polishing Wheels True
Avoid Risk to Operators
Do a Better Job, Too!



Just press them in on your own spindle.

The notches hold the bushing in — the wheel *stays concentric regardless of how often changed.*

What's more,

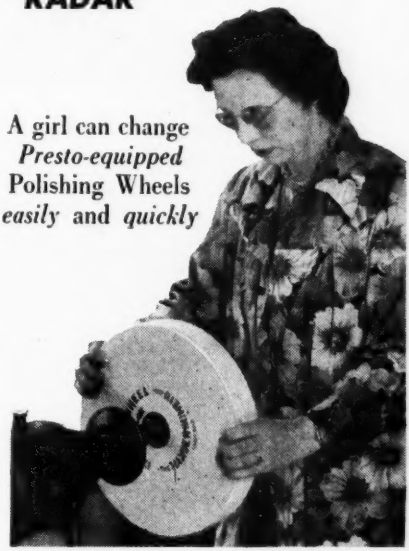
Presto Polishing Wheel Bushings help keep wheels concentric with uniform contact all around. Avoid *wasteful time-consuming truing up*—assure even wear—do a *better job QUICKER* with no waste of grain.

No wonder outstanding plants all over America are using thousands of Presto Bushings. Never before has the Polishing Industry had so much benefit at such low cost.

Write for *FREE Samples* and see the many advantages. Just specify size of spindle on which the wheel will be used.

Jobbers in principal cities.

Modern as
RADAR



A girl can change *Presto-equipped* Polishing Wheels *easily* and *quickly*

Specify "*Equipped with Presto Bushing*" when you order Polishing Wheels

The MANDERSCHEID *Co.*

605 West Washington St., Chicago 6, Illinois

Serving the Metal Finishing Trade over 35 Years.

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NEW · LOW BAKE · QUICK BAKE

PORCELAIN LIKE FINISH
NO DISCOLORATION
CLEAR AND IN ANY COLOR
ANY DEGREE OF GLOSS

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PRODUCTS FINISHING DIVISION
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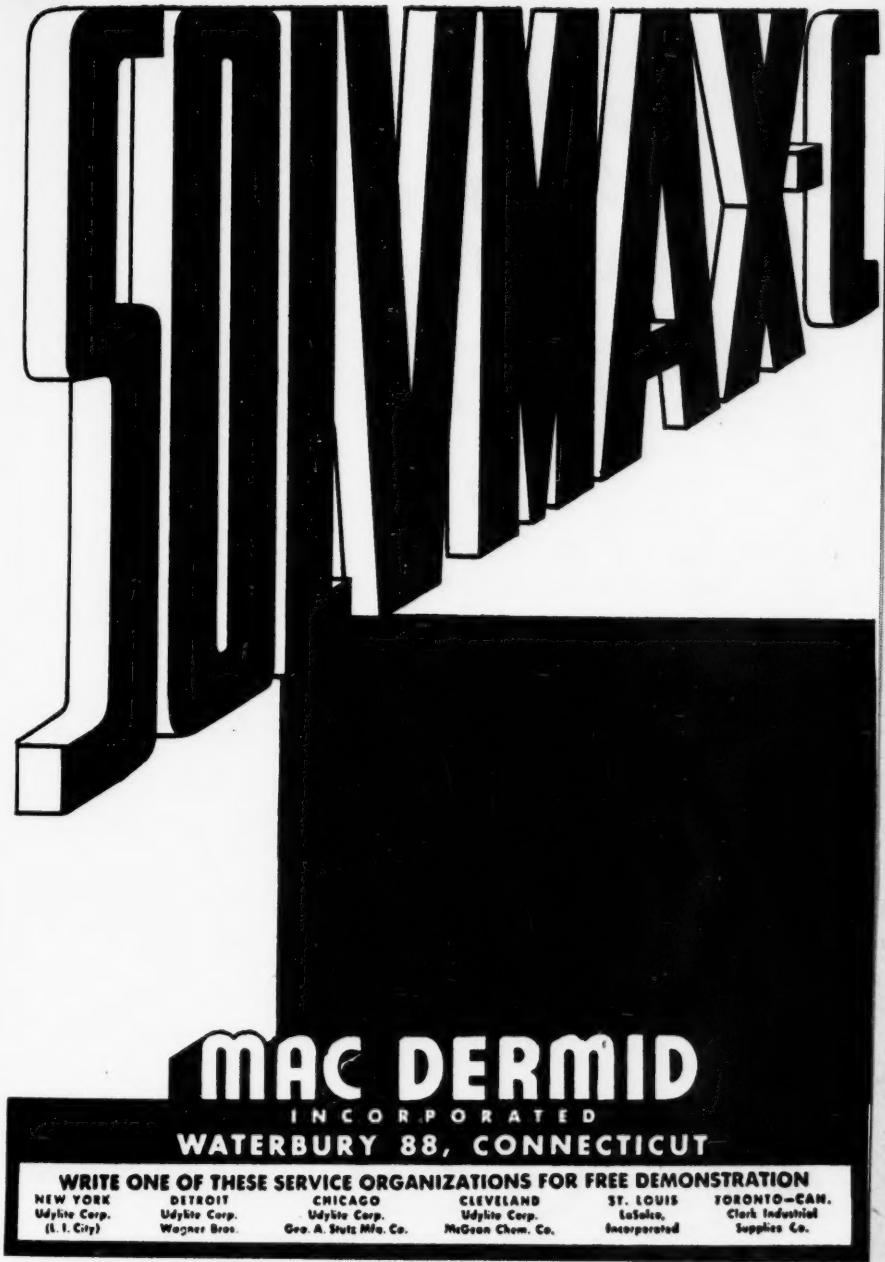

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Quality...versatility...economy...always have been outstanding characteristics of Egyptian finishes.

Through war years Egyptian's high standards steadily have been maintained, with production largely on finishes for war goods, of course.

Now as American industry swings back to production for peace, "quality" and "Egyptian" continue to be synonyms.

We invite inquiries regarding your finish needs, present and future.

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SPECIALIZED PRODUCTION FINISHES

DURANITE

High Speed The Production Finish

DURANITE is the high-speed plastic base production finish. It comes in clear and a wide range of colors for spray, dip or roller-coat application. May be used with infra-red or convection oven baking.

Sorry . . . but some specialized qualities of DURANITE will not be available till raw materials are released. However, some formulas ARE in production—we'll be glad to tell you more about them.

ZAPON DIVISION

ATLAS POWDER COMPANY

Eastern Sales: Stamford, Conn. Western Sales: No. Chicago, Ill.

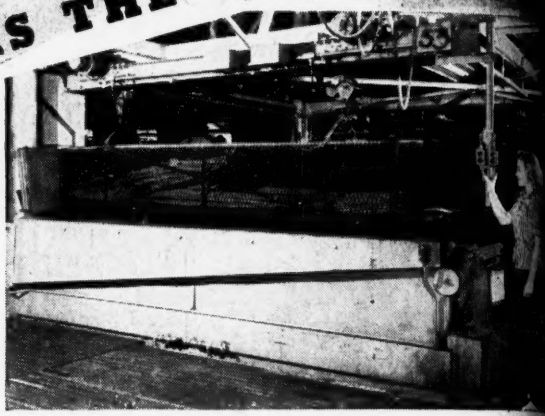
SPECIALIZED PRODUCTION FINISHES... *Doing Tomorrow's Job Today!*

Perm-A-Clor

STRENGTH IS THE ANSWER

for

VAPOR-DEGREASING
OF
ALUMINUM TUBING



AND *All Tough* METAL CLEANING PROBLEMS

When the war jolted production of aluminum tubing into high gear, one west coast manufacturer immediately called upon a Detrex Service Man to help in analyzing his degreasing problem. Aluminum tubing—vital in aircraft production—required a solvent possessing the utmost in stability. The answer—PERM-A-CLOR. Today, after a record run of more than three and a half years, PERM-A-CLOR is still being used.

Having the highest stability of any degreasing solvent, PERM-A-CLOR is right for any combination of metals.

PERM-A-CLOR and Triad are stocked in the following cities:

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Birmingham, Ala.	Houston, Tex.	Reading, Pa.
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Buffalo, N. Y.	Kansas City, Mo.	Salt Lake City, Utah
Cambridge, Mass.	Lima, O.	Saginaw, Mich.
Charlotte, N. C.	Los Angeles, Cal.	San Francisco, Cal.
Chattanooga, Tenn.	Lockland, O.	Seattle, Wash.
Chicago, Ill.	Milwaukee, Wisc.	Somerville, Mass.
Charlestown, Mass.	Minneapolis, Minn.	South Bend, Ind.
Cincinnati, O.	Nashville, Tenn.	Springfield, Mass.
Cleveland, O.	New Haven, Conn.	Syracuse, N. Y.
Dallas, Tex.	Newark, N. J.	Tulsa, Okla.
Dayton, O.	Niagara Falls, N. Y.	Toledo, O.
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